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Railway Development in Africa

WHATEVER political changes may take place in Africa there is almost no territory of which the future prosperity does not depend on construction of new railways or increase in the carrying capacity of existing lines by provision of additional motive power and rolling stock, or new signalling. Nearly all African territories are hungry for capital for railway and other development. An urgent call for increased help for these under-developed countries was made recently by President Eisenhower. The Special Commonwealth African Assistance Plan (S.C.A.A.P.) initiated by the Commonwealth Finance Ministers in London last week, is intended mainly to focus attention on the need to help less industrially developed territories of the Commonwealth. It will not raise funds, but members of the Commonwealth will continue, and, it is hoped, increase their technical assistance to the less industrialised African countries; and the progress made will be reviewed once a year by S.C.A.A.P. The achievement of independence next week by Nigeria is unlikely to weaken the association between the Nigerian Railway and British manufacturers of locomotives and other railway material. That is subject to capital being forthcoming for purchases from the United Kingdom, and to prices and delivery dates being satis-

factory considered in relation to those quoted by competitors from outside the Commonwealth, whose offers will increase in frequency and attractiveness. In the many successor States to the French empire in West and Central Africa there are many efforts to fill the vacuum left by withdrawal of French control. Some new governments are eager to exploit their freedom by awarding contracts to manufacturers in countries other than France. Guinea, some weeks ago, placed orders for passenger stock with German builders; more recently, and for motives apparently political rather than utilitarian from the purely railway aspect, it concluded an agreement with U.S.S.R. for technical assistance in increasing the capacity of its metre-gauge railway. Other African countries are unlikely to seek Russian aid, but all, whether in or outside the British Commonwealth, will be tempted to place orders wherever they think they will obtain what they want at a reasonable price—and wherever the conditions attached to some loans may allow. Further World Bank loans may be expected in the near future for railway development in countries which have proved themselves stable and economically viable. Western Germany may be active in making loans, as urged by the International Monetary Fund. The British Commonwealth must not let the interests of its members who manufacture railway and other equipment, and of users who seek the best, go by default.

Increased Competition

COMPETITION for orders for locomotives and other equipment for railways in countries in Africa and Asia which have achieved sovereignty is becoming increasingly severe. Manufacturers in most industrialised countries in Western and Central Europe, including those behind the Iron Curtain, in the U.S.A., and in Japan now claim to have experience of the special needs of railways in the tropics. Replacement of steam by diesel traction means that good records in supplying steam locomotives over the years counts for less; some managements may feel that the reliable builders from whom their undertakings long obtained steam power are likely, with their considerable experience of diesel traction in addition, to produce some of the best diesel locomotives and railcars. The tradition of good workmanship and the extensive knowledge of local conditions are continuing assets. They are of equal value in the construction of passenger and goods vehicles and signalling equipment. Some chief officers of railways overseas may not think so, and, if they do, they may be over-ruled, in choosing suppliers, by superiors inspired by political or other motives. Consideration of tenders, moreover, is sometimes bedevilled by the urge to select the apparently cheapest—at whatever subsequent cost.

Manufacturers' Plan for Industrial Relations

RECOMMENDATIONS in the "British Charter of Industrial Relations" issued by the National Union of Manufacturers last week include establishment of a "national conciliation council" to adjudicate on any national dispute referred to it by employers or trades unions. It is hard to see what could be achieved by such a body, which would resemble the Industrial Disputes Tribunal, recently abolished, which could not be effected by using existing procedures. No doubt the N.U.M., which is greatly concerned with the deterioration in industrial relations which it believes to have occurred in the past few years, feels that drastic action is necessary at national level, but it seems to have overlooked the possibilities of the present machinery in most industries—provided the parties concerned wish to make it work. Other recommendations are establishment of local conciliation councils for purely local disputes, and the suggestion that employers should offer employment contracts incorporating "a reasonable period of notice," preferably one month. These proposals are the result of study by a body representing 5,000 firms in a wide range of industries. The tone of the whole series is conciliatory, and rules out any suggestion that manufacturers as a body are intransigent.

Norwegians Study British Transport

BRITISH practice and problems of rail and road transport were studied by a Norwegian delegation which visited this country earlier this month. The party of 20 consisted of

members of the Communications Committee of the Storting (the Norwegian Parliament), and senior staff of the Ministry of Communications, and of the Norwegian State Railways and the Public Roads Administration. Officers of the Norwegian State Railways taking part were: Mr. A. Hofstad, Director of Organisation & Traffic; Mr. H. F. Haraldsen, Chief of the Organisation & Methods Office; and Mr. V. Hunseid, Chief Inspector. During the tour, the delegation had discussions with the Ministry of Transport, and the British Transport Commission on various matters including railway practice. At the conclusion of their visit to London, members travelled by British Railways to Scotland and over almost the whole length of the West Highland line of the Scottish Region, returning from Mallaig to Fort William in the observation car.

Late Publication of Timetables

THE winter passenger timetables, effective from September 12, of several Regions of British Railways were late in appearing, and letters of complaint were published in *The Times*. In a reply, Mr. K. W. C. Grand, Member of the British Transport Commission and formerly General Manager of the Western Region, points out some of the difficulties of timetable production. Railway timetables, he states, are about the most complicated pieces of work that go regularly to a printer. For the timetables to be available at stations, say, 14 days before the winter services start, the manuscripts have to be with the printers by mid-May. The intricate work of compiling the manuscript takes several months in a large Region, and during the months of preparation, various developments may have drastic effects on the timetables. Either a series of amendments must go to the printers, resulting in late publication, or, simultaneously with the issue of the new tables, supplements must be issued to amend them. This is the dilemma in which Regional managements find themselves every half-year. This year preparation of timetables has been complicated by the introduction of an exceptional number of new services and the re-timing of others. Mr. Grand affirms that the summer timetables will be available earlier next year, well in advance of the start of the summer schedules. It is hoped that in due course, by the use of electronic machines, the time taken in compiling new tables will be cut considerably.

Travolators at Bank Station

THE long walk along the subway from the platforms of the Waterloo & City line, British Railways, Southern Region, at Bank Station, was no doubt tolerable in the more leisurely times in which the subway was built 60-odd years ago. In recent years it made progress too slow to clear the large number of passengers using the subway during rush-hour periods. Several schemes for dispersing the passengers have been considered since 1939, but for various reasons the final scheme, a Travolator based on the normal escalators used by the London Transport Executive, was not approved until 1957. Work has now been completed, and the installation, described on page 390, was inaugurated last Tuesday by the Lord Mayor of London, Sir Edmund Stockdale. The idea of using moving walkways originated in the U.S.A., where "speed walks" were introduced some years ago in Chicago and certain other places for the rapid movement of passengers, though as long ago as 1903 a scheme was prepared by Graham Morton & Company of Leeds, showing an almost identical form of transporter for installation in the inclined Bank subway.

Three Years' Activity on the G.N. Line

RE-ORGANISATION of the Eastern Region, British Railways, with formation of the Great Northern, Great Eastern, and London Tilbury & Southend Lines, took place in September, 1957. What has been done on the G.N. Line in three years is outlined in a pamphlet distributed to passengers. This publication is the more likely to convince because it states facts without exaggeration, and provides much information in five pages. There are brief notes on the diesel services introduced during the three years; on improvements to the track; on the reasons for diversions, and the effect on punctuality; and on the introduction between Kings Cross and Edinburgh of 3,300-h.p. Deltic diesel

locomotives towards the end of 1961, with resultant accelerations. A list of achievements since September, 1957, includes the new tunnels between New Barnet and Potters Bar; equipment of main-line locomotives with automatic warning system; re-building of four major passenger stations and three goods depots; and the introduction of special express services to ports for consignments for export. A helpful feature is a sketch map of the G.N. main line showing the main areas of civil engineering and diversionary routes where modifications to services may be necessary and delays may occur.

The "Master Cutler"

THE new "Master Cutler" Pullman train, which undertook its inaugural run between Sheffield Victoria and Kings Cross in the Eastern Region of British Railways on September 28, is the first locomotive-hauled Pullman set built since 1951, and the first to use the new Commonwealth bogie. This bogie, recently chosen as a future standard feature for British Railways, incorporates mono-bloc cast-steel frames and Timken roller bearings and axleboxes. The coaches, which form part of an order for 44 placed with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., will replace existing stock in the Eastern, North Eastern, and Scottish Regions. Services affected—in addition to those on the Sheffield-London route—will be "The Yorkshire Pullman," "The Tees-Tyne Pullman," "The Queen of Scots," and "The Harrogate Sunday Pullman." Distinguished passengers on the new train's inaugural run included the Master Cutler, Mr. P. J. C. Bovill; several other leading citizens of Sheffield, Mr. J. B. Peile, J.P., Member of the Eastern Area Board of the British Transport Commission, and senior members of British Railways and of the Pullman Car Co. Ltd.

World Bank Loans for Railway Development

THE largest loan for railway purposes made by the International Bank for Reconstruction & Development in the year ended June 30, 1960, was to the Republic of India. This was the \$50 million, 20-year 6 per cent loan of July 15, 1959. The report of the Bank for these 12 months shows that the loan was applied mainly to expenditure on imported railway equipment, materials, and services during the fourth year, which ended on March 31, 1960, of the Second Five-Year Plan (1957-61). The \$12.5 million, 15-year, 6 per cent loan of November 30, 1959, to Pakistan is helping to meet the minimum requirements of the North Western and Eastern Bengal Railways pending formulation of a development programme to be implemented during the period of Pakistan's Second Five-Year Plan. In Africa, a 6½ per cent, 15-year World Bank loan of \$66 million is helping to finance the development of iron ore deposits at Fort Gouraud, in Mauritania; this includes building a 420-mile railway from mines to the Atlantic coast and construction of a new port for handling ore delivered by rail at Port Etienne. During the year, the report states, some industrialised countries have taken action not only to increase the flow of funds for development, but also to improve co-ordination of their assistance to the less developed areas.

India to Build Railcars

MANUFACTURE of diesel railcars in the Integral Coach Factory at Perambur, near Madras, is under consideration by the Government of India, but no order has been placed. Announcing this, the Deputy Minister of Railways, Mr. Shah Nawaz Khan, told Parliament recently that tentative proposals for the Third Five-Year Plan provided for procurement of 197 railcars, all to be constructed at Perambur; the cost of 67 5-ft. 6-in. gauge cars would be about £45,000 each; that of 120 metre-gauge cars, £28,000; and each of 10 cars for narrow-gauge lines was estimated to cost some £18,500. As to designs, the Deputy Minister said only that these would be suitable for indigenous manufacture. Components are to be made at Perambur and elsewhere, but it appears to be intended that they shall be supplied from Indian sources whenever possible. It will be interesting to see whether Indian built broad-gauge railcars will resemble the 400-b.h.p. diesel-mechanical cars supplied in 1958 by the Commonwealth Engineering Co. Ltd.

Integral Coaches

AS to the manufacture in India of integral-type coaches, the Chairman of the Railway Board, Mr. Karnail Singh, states that production rate recently was 41 a month. Their main structure consists of a frame composed of large-size rectangular section tubing forming the skeleton of the roof, walls and floor, and taking the whole load without the need for any supporting underframe. The weight of the average 5-ft. 6-in. gauge integral coach is therefore only 36 tons compared with the 42 tons of the vehicle of conventional design, and it carries 80, against 76, passengers. Integral coaches, of which over 1,000 are already in traffic, have bogies fitted with roller bearings, shock absorbers and rubber pads. These all-steel vehicles are lighter in maintenance and less liable to destruction in accidents than the older coaches containing much timber. Mr. Karnail Singh concluded his broadcast by remarking that having attained self-sufficiency in locomotives and coaches for all their own requirements, Indian railways now had the capacity to help neighbouring countries in this respect, and also in the supply of wagons and other equipment such as train-lighting and signalling equipment, cast-iron sleepers, girders, and accessories.

European Railway Road Services

DURING the past summer the Union of European Railway Road Services (U.R.F.) celebrated its tenth anniversary. It was founded because of the serious situation then being caused to a number of European railway administrations by the development of international road transport in the hands of private operators. The initial organisation was set up as the result of a conference in 1950, attended by representatives of ten large railways in Western Europe, and received its present name in 1951. The purpose for which the first conference was called was to try and get continuous contact between the railways interested in a common policy; and with this aim in view the main objective of U.R.F. has been to ensure that railway interests are observed in any international discussions on road transport, and that road services operated by the railways are co-ordinated with those of private enterprises, as far as railway interests might be affected. The U.R.F. co-operates with the International Union of Railways (U.I.C.) as a participating organisation. In view of the general decrease in railway international freight traffic, it is believed that U.R.F. will come to take a more active part in international road transport freight services. In passenger services the Europabus network is perhaps the most notable outcome of the foundation of U.R.F.

Bulgarian Electrification Plans

ANNOUNCEMENT by the Bulgarian State Railways administration that 1,200 track-miles are to be electrified in the next 10 years is not surprising. Financial doctrine and practice in Communist countries allows of far-reaching development schemes without, apparently, the consideration of economic factors which is incumbent on railway managements in the free world. The total route mileage of the Bulgarian State Railways is only some 2,000, mostly single. The most suitable stretch for electrification appears to be the 250-odd miles from the Yugoslav frontier at Dragoman, *via* Sofia and through the length of the country to the entry at Svelingrad into an enclave of Greece, *en route* to Istanbul. This is part of the trunk route between Western and Central Europe and the Near East *via* Belgrade, and conveys a considerable goods traffic; there are moreover some severe gradients. Whether any other sections are suitable, by Western standards, for electrification is doubtful, though economic activity seems to have resulted in increased traffic generally. As in U.S.S.R., the system chosen is likely to be 25 kV., a.c. No doubt much of the equipment will be obtained from Russia and other countries behind the Iron Curtain.

British Wagons for New Zealand

WIDE doorways with a 10-ft. opening for loaded pallets are a feature of the 500 four-wheel steel-covered goods wagons being supplied by Charles Roberts & Co. Ltd. for the 3-ft. 6-in. gauge New Zealand Government Railways.

Manufacture is in the builders' works at Horbury Junction, Wakefield, and assembly in New Zealand at the Railways Department Otahuhu workshops. The first of the series, known on the N.Z.G.R. as the "Kp" class, was placed in service recently. Tare is 7½ tons and the load 14 tons, or about 1,000 cu. ft. of merchandise. To distinguish them from other covered goods wagons, they are painted silver instead of the standard red oxide. Provision is made for palletised loads with a view to expansion of this traffic, which will enable the railways to offer services to compete effectively with road transport. Traffic on the N.Z.G.R. calls for a considerable fleet of four-wheel, as opposed to bogie, wagons.

British Railways Electrification Conference

SUCH rapid developments in the technique of railway electrification have taken place in recent years, particularly in the field of industrial-frequency systems, that it is appropriate that railway engineers from all parts of the world should meet for a frank exchange of views. Although British Railways has had limited experience with 50-cycle working, it is much to its credit that it should be promoting a conference in London next week for this very purpose. The decision, made by the British Transport Commission in 1956, to adopt the 25-kV. 50-cycle a.c. system for future electrification in Britain, except for extensions to the Southern Region third-rail network, was not an easy one. On the one hand, the Commission could have pinned its faith in the well-established 1,500-V. d.c. system. This choice presented few technical problems and offered the advantage of continuity of practice and manufacture. The alternative of the 25-kV. a.c. system offered greater technical problems and required the development of new designs for locomotives and rolling stock and the conversion of existing d.c. installations. The greater economies offered and wider scope for technical progress overshadowed the immediate difficulties and the final decision was swayed by the definite possibility that the lower cost of a.c. traction might make possible its future application to lines whose electrification on one of the older systems could never have been justified. The problems encountered have indeed been formidable, but they provide valuable experience which can be of great benefit to overseas railway administrations which may be considering an industrial-frequency system.

The British manufacturing organisations, while co-operating with the B.T.C. in staging the conference and associated exhibition, are taking the opportunity to show visiting delegates electric locomotives and electric traction and electric supply equipment in production. It is to be hoped that this will foster interest in the achievements and skill of the British electric traction and locomotive industries to the advantage of their flourishing export trade. The faith of overseas railways in British products is shown in recent orders placed by India for overhead equipment for lines electrified at 25 kV.

Over 40 papers on technical aspects of the 25-kV. a.c. system are being presented. The subjects range over locomotives and multiple-unit trains, power supplies and distribution, civil engineering, interference problems, signalling and telecommunications, instrumentation and measurement, switchgear, and the catenary overhead system. While the papers will undoubtedly present a clear picture of the progress being made with 50-cycle electrification in Britain, it is to be hoped that the subsequent discussions will yield a wealth of opinion and experienced comment which will be of material advantage to all concerned. The technical visits, on Wednesday and Friday, to two of British Railways electrification schemes will provide an opportunity for the specialist engineer to investigate site work and acquaint himself with the difficulties occasioned by local conditions.

The first visit, on Wednesday, will be to the recently-commissioned Crewe-Manchester line of the London Midland Region. This is the first section of the electrification work on the main line between Euston, Birmingham, Manchester, and Liverpool. When work is completed in 1964-65, it is hoped to operate express services between Euston and Manchester, and Euston and Liverpool in some 3hr. The second visit will be an inspection of the main features of the electrification work in the Eastern Region. These schemes embrace a number of new features, including a high percentage of 6.25-kV. route mileage. This emphasises the difficulty which British Railways engineers have to face in providing adequate clearance for a

25-kV. overhead system. The necessity to supply long stretches of line in built-up areas and under bridges, which could not be economically rebuilt, further complicates the rolling stock equipment, as automatic devices must be fitted for selecting the correct transformer primary connections according to the overhead line voltage.

The clearance problem has not been the only difficulty to overcome. Probably the most important has been the interference liable to be experienced in the various signalling and associated circuits. Large sums have been spent on cabling, providing screening devices, booster transformers and so on, and designing new track circuit apparatus. It is felt by many that the necessity to provide this additional equipment has outweighed the advantages claimed in a.c. electrification, but an assessment of the merits of newly-designed equipment would be welcomed by many visiting delegates and is one of the pointers to progress which may be hoped for at the conference.

British Transport Commission Traffic Receipts

SUBSTANTIAL increase in railway mineral receipts is an encouraging feature of the traffic receipts for Period 9, the four weeks ended September 11. At £3,699,000 they exceed last year's figures by £544,000, and reflect increased activity in the steel industry. Merchandise traffics are a little better than in Period 9 of 1959, but the aggregate for the 36 weeks of the current year is only £2,171,000 more than a year ago. Coal class receipts are up on last year's figure for these four weeks. This contrasts with the recent trend. It is the result probably of early despatches of coal to avoid any difficulties in moving traffic during the coming winter. For the 36 weeks total railway freight and parcels receipts were £5,189,000 above the corresponding figure in 1959. This increase compares with that of £7,760,000, the amount by which British Railways passenger receipts for the first 36 weeks of this year exceeded the corresponding total in 1959.

Inland waterways freight, road haulage, and ships' cargo traffics for Period 9 at £4,670,000 were £304,000 more than a year ago. During the preceding four weeks, at £4,111,000, they were only £185,000 up on last year's receipts for this period. Even after taking into account the resumption of industrial activity and trading in September, after August holidays, this seems to indicate a better trend. Road haulage traffic produces the greater part of these receipts.

	Four weeks to		Incr. or decr.	Aggregate for 36 weeks to		Incr. or decr.
	Sept. 11, 1960	Sept. 6, 1959		Sept. 11, 1960	Sept. 6, 1959	
Passengers—	£000	£000	£000	£000	£000	£000
British Railways	13,546	13,235	+ 311	107,829	100,069	+ 7,760
London Transport—						
Road passenger services	4,452	4,313	+ 139	39,201	37,613	+ 1,588
Railways	1,982	1,768	+ 214	17,651	16,266	+ 1,385
Provincial & Scottish buses	5,576	5,716	— 140	43,504	42,852	+ 652
Ships	1,261	1,409	— 148	5,937	5,958	— 21
Total passengers	26,817	26,441	+ 376	214,122	202,758	+ 11,364
Freight, Parcels & Mails—						
British Railways—						
*Merchandise & livestock	7,624	7,271	+ 353	69,345	67,174	+ 2,171
*Minerals	3,699	3,155	+ 544	33,445	29,612	+ 3,833
*Coal & coke	7,741	7,185	+ 556	72,434	74,726	— 2,292
*Parcels, etc., by coaching train	4,365	4,190	+ 175	38,266	36,789	+ 1,477
*Total freight, British Railways	23,429	21,801	+ 1,628	213,490	208,301	+ 5,189
Others†	4,670	4,366	+ 304	39,266	37,558	+ 1,708
Total freight, parcels & mails	28,099	26,167	+ 1,932	252,756	245,859	+ 6,897
Total	54,916	52,608	+ 2,308	466,878	448,617	+ 18,261

*Includes receipts from collection and delivery and from railway freight traffic within Commission-owned dock areas

†Inland waterways freight, road haulage and ships

Railway passenger receipts are disappointing. Period 9 necessarily embraces the end of the holiday season. It is not surprising that traffics should be considerably below those in the preceding four weeks; but whereas for Period 8 passenger receipts at £17,001,000 were £827,000—which is not very much—more than a year previously, receipts for Period 9 are £13,546,000, and the excess over last year's figure is only £311,000; the weather could hardly account for this.

London Transport Underground traffics at £1,982,000 are £214,000 more than a year ago, and an improvement on Period 8 (£1,978,000). The considerable drop in ships' passenger traffics presumably is the result of the unofficial strike of seamen, which affected a good many services to Ireland and the Continent in August.

	PERCENTAGE VARIATION 1960 COMPARED WITH 1959	
	Four weeks to Sept. 11	36 weeks to Sept. 11
British Railways :		
Passengers	+ 2.3	+ 7.7
Parcels	+ 4.1	+ 4.0
Merchandise & livestock	+ 4.8	+ 3.2
Minerals	+17.2	+12.9
Coal & coke	+ 7.7	— 3.0
Total	+ 5.5	+ 4.1
Ships (passengers)	—10.5	— 0.3
British Road Services, Inland Waterways & Ships (cargo)	+ 6.9	+ 4.5
Road Passenger Transport, Provincial & Scottish	— 2.4	+ 1.2
London Transport :		
Railways	+12.1	+ 8.5
Road services	+ 3.2	+ 4.2
Total	+ 5.8	+ 5.5
Aggregate	+ 4.3	+ 4.0

London Midland Region Winter Timetable

THE most important development in the London Midland Region winter timetable is introduction of electric working between Crewe and Manchester. Mayfield Manchester, station, has been turned into a parcels depot, and no longer accommodates passenger trains. The extension of the Crewe-Manchester stopping services to and from Manchester Oxford Road is a great convenience to many city workers and relieves the terminal platforms at Piccadilly (formerly London Road) station of this traffic.

In place of the previous sparse and irregularly-time service of Crewe-Manchester stopping trains, which included nothing, for example, between 9.21 a.m. and 1.11 p.m. from Crewe, there is now an hourly service. Trains leave Crewe at 3 min. past each hr., taking 53 min. to Piccadilly and 56 min. to Oxford Road, or 7 min. faster than the previous diesel trains. Departures from Oxford Road are at 35 min. past the hr. and from Piccadilly 3 min. later. On the Styal line the intervals between trains during off-peak periods are 2 hr., though they come down to 20-30 min. at morning and evening peaks. Trains stopping at Crewe now change engines there, and special sidings have been laid in to facilitate this; London trains which do not stop at Crewe, such as the "Mancunian," and those routed via Stoke, work into and out of Piccadilly with their diesel locomotives. Restoration of the London trains to their normal Manchester terminal has resulted in acceleration, though with the heavy recovery allowances between Crewe and Euston the times are inevitably below those in force before commencement of modernisation works. The 7.55 a.m. from Piccadilly now takes 4 hr. 5 min. (26 min. faster), the non-stop 9.40 a.m. "Mancunian" 4 hr. (18 min. faster), the 2.10 p.m. 4 hr. 13 min. (13 min. faster), the 4.10 p.m. "Lancastrian" 4 hr. 11 min. (23 min. faster), and the 5.55 p.m. "Comet" 3 hr. 55 min. (27 min. faster). In the down direction the principal improvement is in the 6 p.m. "Mancunian," accelerated from 4 hr. 30 min. to 4 hr. 1 min.; the 9.35 a.m. "Comet" (3 hr. 57 min.) is 16 min. faster; the former 11.30 a.m. now starts at 11.20 a.m. and takes 4 hr. 20 min. (13 min. faster); while the 4.20 p.m. arrives at 8.37 p.m., 22 min. earlier. Changes in the Euston-Liverpool service are not great.

The earlier departure from Euston for Heysham of the "Ulster Express" (5.40 p.m.) has been made permanent. The former 9.27 a.m. from Wolverhampton to Euston now starts at 9.42 a.m. and arrives 10 min. later, at 1.1 p.m. Between Euston and Glasgow a notable alteration is that of the 9.5 a.m. "Royal Scot." To regain some of the patronage lost as the result of its departure from Euston so much earlier than the former time of 10 a.m., this train now calls at Preston at 1.13/1.15 p.m., and runs the 90.1 miles thence to Carlisle in 89 min. The "Royal Scot," the "Midday Scot," and the "Caledonian" all have a further 10 min. recovery time added to their schedules, making a total 48 min. for recovery between Euston and Preston, but with none whatever north of that point. The

"Midday Scot" and the "Caledonian" now leave Euston at 12.50 p.m. and 3.35 p.m. respectively.

Re-organisation of the service on the former Midland Railway lines, in the interests of better timekeeping, has resulted in change in the departure of expresses from St. Pancras to the North from 15 to 10 min. past the hr. Non-stop times over the 123.5 miles between St. Pancras and Nottingham are increased from 124 to 126 min., but three runs up and one down between St. Pancras and Leicester, 99.1 miles, are reduced to 98 min.

Indian Third Five-Year Plan

IN the Government of India Third Five-Year Plan period beginning six months hence, £1,087,500,000 is allocated to transportation and communications, and of this £667 million, or over 65 per cent, is to be provided for railways alone. A revised estimate of traffic in the current fiscal year ending March 31, 1961, is 162,000,000 tons, against 114,000,000 tons in the year ended March, 1956, so that there has been an increase of approximately 42 per cent during the years covered by the Second Plan. During the Third Plan period the tonnage is expected to mount to about 235,000,000, an increase of 73,000,000 tons or about 45 per cent. Some 70 per cent of this increase is likely to be in iron and steel, coal, and cement traffic. The estimated 235,000,000-ton figure for the year 1965-66 is based on the expected production of 8,700,000 tons of steel ingots, 1,500,000 tons of pig iron and 95,000,000 tons of cement, figures that are exclusive of the production from the new steel plant at Bokaro. On the basis of miscellaneous traffic increases during the past few years the increase in this traffic during the Third Plan period should be at least 5 per cent a year.

During the first three years of the Second Five-Year Plan period the number of passengers originating rose from 1,275,000,000 to 1,422,000,000 or by 11.5 per cent, suburban passengers increasing by 17.8 per cent and other passengers by 7.5 per cent. For the Third Plan it is assumed that there will be a 3 per cent per annum rise in the number of non-suburban passengers.

Besides the proposed allocation of £667,000,000 for the railway development programme, it is tentatively estimated that a sum of about £247,500,000 will be available from the Railway Depreciation Reserve Fund for replacements. The total sum available will then be £915,000,000 and the suggested distribution between development programmes are as follow:—

Rolling stock	£ 361,500,000
Electrification	52,500,000
Signalling and safety works	18,750,000
New lines	90,000,000
Workshops, plant and machinery	37,500,000
Track renewals	127,500,000
Line-capacity works, bridge and other structural and electrical works	171,000,000
Staff quarters and welfare	37,500,000
Users' amenities	11,250,000
Road services	7,500,000
	915,000,000

These figures make no provision for stores suspense, estimated at £26,250,000.

To cater for expected traffic increases and also for replacement of over-age stock the following rolling stock programme has been framed:—

	Locomotives	Coaching vehicles	Wagons
Additional	1,031	4,983	83,169
Replacement	614	2,854	26,697
Total	1,645	7,837	109,866

These figures are subject to review when detailed information about the pattern of future traffic becomes clearer. In assessing the requirements of rolling stock it was assumed that at the end of the Third Plan period engines and wagons up to 45 years old and coaches up to 36 years (broad gauge), 40 years (metre gauge), and 45 years (narrow gauge) will be retained in service. The numbers of older stock that will also then be retained will be the same as those of over-aged stock at the end of the Second Plan period.

In estimating the requirements of additional stock the operational improvements achieved and planned have been considered. The requirements in connection with the bulk movements of coal and other raw materials have been based on the minimum wagon turn-round time. It is assumed that 20 per cent of the additional miscellaneous goods traffic will

be able to be carried in empties returning to the coalfields. All requirements have thus been kept to a minimum.

The development programme includes a substantial provision for works to augment the Third Plan. As well as for those carried forward from the Second Plan, namely the Garhwa Road-Robertsganj, Sambalpur-Titlagarh and Bimalgarh-Kiriburu, provision is made for the following additional new lines: Jhund-Kandla (144 miles), Madnoper-Kathna, Udaipur-Himatnagar, Delhi avoiding lines, Diva-Panvel-Uran, Patharkandi-Dharamnagar, Guna-Maksi, Ranchi-Bondamunda, Hindumalkot-Sriganganagar, Ghaziabad-Tughlakabad and Bailadilla-Kotavalsa (310 miles). Some 200 miles of branches for the development of the coal industry are expected to be required during the Third Plan period.

Provision is made for building about 54,000 staff quarters besides those required in connection with workshop, yard-remodelling and other specific schemes. In every phase of the Third Plan railway programme self-sufficiency has been kept in view, and it is hoped that diesel and electric locomotives now imported will be able to be built in India during that period.

The requirement of foreign exchange for the Second Plan was £240,000,000 and assistance was given by the World Bank; but for the Third Plan only £97,500,000 are required.

New Zealand Government Railways in 1959-60

A COPY of the report of the New Zealand Government Railways for the year ended March 31, 1960, signed by Mr. A. T. Gandell, the General Manager, has been sent to us. Mr. Michael Moohan, Minister of Railways, in his introduction to the report, comments that gross revenue of £34,936,914 was an all-time record. Goods and livestock tonnage for the whole of New Zealand was almost a record, but competition from airlines and the ever-increasing number of motor-cars on the roads have hit long-distance passenger traffic. Despite this competition, says Mr. Moohan, "there is still a very definite preference and demand from a large section of the public for rail transport, and action has already been taken to initiate improved passenger trains."

Mr. Gandell reports that throughout the year there was a continuing emphasis on the attraction of business and on economy in operation, with encouraging results to management and staff alike. Light-weight metal containers for door-to-door service have been provided, more fork-lift trucks and mobile cranes installed in sheds and yards, and the use is being extended of bulk cement and hot bitumen wagons. Rates for bulk consignment have been introduced, and more free craning of goods provided. Passenger traffic has been encouraged by extending the availability of tickets, extending the period of advance bookings, and by reducing the cost of family travel.

Total goods and livestock tonnage for the year was only 1.26 per cent below the record achieved in 1955-56. Within the total the tonnage carried in the North Island did reach a peak. Improved operating efficiency was reflected in new record figures for average loading and speed in trains, in improved turn-round of wagons, and the increased tonnage handled by diesel locomotives. The total revenue of £34,936,914 was slightly exceeded by total expenditure of £35,500,047, the resulting £563,133 working loss being recovered from the Department's reserves.

The principal financial and other results of the year's working are given below:—

	1959-60	1958-59
	Millions	
Passenger journeys	26.13	25.44
Goods tonnage	9.88	9.72
Total train-miles (revenue)	14.48	14.60
	£ millions	
Coaching traffic earnings	2.79*	2.81*
Goods traffic earnings	26.78*	26.31*
Total revenue	34.93	34.37
Expenditure	35.50	35.13
Net revenue or loss	— 0.56	— 0.76
Interest charges	5.38	5.19

*From April 1, 1959, revenue from parcels traffic has been included in goods traffic and the figures have been adjusted correspondingly. Revenue from luggage is included in passenger traffic.

Gross revenue increased 1.64 per cent, the main increase being in rail-goods revenue, and some gains from subsidiary services and non-operating income. Gross expenditure rose 1.03 per cent, with lower locomotive-fuel costs, depreciation and

renewals offset by the higher cost of wages, stores, materials, and miscellaneous expenditure. The total number of passenger journeys went up by 697,397, or 2.74 per cent, to 26,134,480, the best since 1949. There were 776,681 more suburban journeys but 79,284 fewer non-suburban movements. Increased suburban traffic was experienced mainly in Wellington and Auckland, and to a lesser degree in Dunedin. Goods traffic at 10,543,097 tons was nearly a record, while net ton-miles of 1,171 millions was the best yet achieved. Timber traffic reached a record of 1,569,808 tons, with substantial gains in other items such as manures, phosphates, cement, frozen meat and cheese. These were partly offset by lower coal and grain traffics.

The Department's Rail-Air service for inter-island traffic again secured a substantial rise in business, with the tonnage flown across Cook Strait up 14.27 per cent to 40,704 tons. The more intensive use of diesel locomotives enabled a big decrease to be obtained in coal and oil-fired locomotive mileage, leading to a decline of £122,361 in locomotive fuel costs. Diesel mileage was 23.84 per cent of total train miles. Had oil-burning steam locomotives been used for the mileage run by the diesel-electrics, the fuel cost would have been £800,000 to £900,000 greater. Conversely, had diesel-electrics been available to replace oil-burners entirely, a further saving of £475,000 would have resulted.

Wagons on order and under construction to complete a 1954-58 building programme include 44 livestock wagons and 933 goods wagons, and in addition provision is made in a 1958-63 programme for the building of 3,155 wagons of various classes. The main-line locomotive power position was unchanged. Diesel shunting power was augmented by 18 "Dsc" Bo-Bo type locomotives, and five new 150-h.p. tractor-type locomotives were delivered by A. & G. Price Limited during the A further five have been ordered. A start will be made in the current year on a further 20 diesel shunters, to be built on the South Island.

An American Statistical Summary

(By a correspondent)

IN July the Bureau of Railway Economics, Association of American Railroads, published its 44th summary of U.S.A. Class 1 railway operations. The results of 12 years railroading from 1948 to 1959 are set out clearly in 15 massive tables. The American statistics give all the information available for British Railways and many useful figures as well. It may be instructive to note some of the differences in practice in the States.

When dealing with freight services the railroads lay stress on gross ton miles. They increased the net train load by 24 per cent from 1,176 tons in 1948 to 1,463 in 1959, while the gross train load rose by 28 per cent from 2,500 tons to 3,206. Oddly both loads set up new records, though 1959 was not a great traffic year. The railroads also measure the output of freight train operation by gross ton miles per train hour; they lifted that statistic from 39,823 in 1948 to 61,926 last year, a jump of 55 per cent.

Daily mileage averages for locomotives seem to be lacking on our railways. An American table of line-haul statistics tells that an active freight locomotive ran 117 miles in 1948, 150 miles in 1956 and 145 in 1959. Over these years freight train speed between terminals, including shunting time at stations, rose from 16.2 m.p.h. to 18.6 and then to 19.5, a 20 per cent gain. Last year the ratio of train shunting hours to total train hr. for the whole system was 23 per cent; on individual roads it varied from 42 on the New York Central, 17 on the Pennsylvania and 23 on the Santa Fe to 10 on the Union Pacific and 9 on the Western Pacific.

While freight train traffic was becoming more mobile in America, on a widespread scale, British Railways speeded up a number of selected services but failed to raise the general standard of performance. In 1959 steam locomotives still moved the bulk of the traffic and worked 9.48 freight train miles in a train engine hour, when all time spent by train engines on shunting was left out of account. That rate of progress was a shade slower than the former railway companies achieved in 1933, when the industrial depression between the wars was at its worst, though they handled 253 million tons

against 234 million in 1959, or a difference of 7.5 per cent.

In America the large number of exchange points between over 100 railroads makes yard service for freight train traffic an important matter and it is treated separately from main line working. Precise records are kept of yard shunting locomotive hours and of the mileage they perform. In 1959 shunting hours numbered 36,253,150 and mileage was 217,147,350, so that the average shunting unit covered nearly 6 miles in an hour. The length of time a yard locomotive was kept in service varied from 18 hr. a day on the Chesapeake & Ohio to 13.6 on the Pennsylvania and 14.3 on the Norfolk & Western, but the general average on U.S.A. railways was 14.5.

Our railways are committed to a programme for concentrating a large share of freight traffic in all Regions at new marshalling yards, equipped, as a rule, with retarders and other devices for classifying wagons into train loads for prompt conveyance to destination. The time is therefore opportune for a revision of traffic statistics to show the amount of shunting by train and yard locomotives and the speed of trains between terminals. In particular the old practice of estimating shunting miles on the basis of 5 miles per shunting hour should cease. It was never satisfactory and does not suit modern conditions.

This American statistical summary for each year contains a unique statement, giving the number of wagons and tonnage originated for over 260 commodities, together with the gross revenue earned. The preparation of the 1959 statement involved an analysis of 28,226,060 wagon loads, 1,232,201,060 tons and a revenue of \$8,704 million. Many railroads include in their annual reports a classification of freight traffic by commodities and show the revenue accruing from each separate product.

The Bureau of Railway Economics goes a step further by dealing with the U.S.A. railway system in a thorough manner. Its statements reveal the wide fluctuations in the old basic traffics, like coal, ore and grain, but also record the growth of new products like plastics, which expanded from 560 wagon loads in 1950 to 32,070 last year, carrying 896,000 tons and earning \$21,150,300.

We have been without commodity statistics since the Ministry of Transport discontinued the pre-war railway returns, which gave originating tonnage and receipts for 20 principal commodities charged at "Station to Station" rates. A comprehensive post-nationalisation survey of freight train traffic is long overdue.

Letter to the Editor

(The Editor is not responsible for opinions of correspondents)

Motive Power in U.S.A.

September 19

SIR,—With reference to the editorial note in your September 16 issue on motive power on the New York Central Railroad, practically all rolling stock is bought in the U.S.A. by the issue of equipment trust certificates or by conditional sale agreements. Before trust certificates can be issued, a railway must make a down payment from its liquid resources, usually at 20 per cent of the value of the stock. The amount of certificates issued then ranks as funded debt and appears in the balance sheet along with other long-term debt.

The railroads, therefore, are entitled to include the rolling stock in their statement of equipment owned. The same reasoning applies to sales agreements, and every railroad report should give full details of all equipment obligations.

Interest on funded debt is the main item in fixed charges and has not been excessive in recent years. The rates of interest for equipment trusts, however, has risen, and that is probably why Mr. J. M. Symes, of the Pennsylvania Railroad, has urged the Government "to buy and lease equipment to railroads on the basis of a full pay-back of cost, plus a return to the Government on its investment."

Yours faithfully,

R. BELL

Clacton-on-Sea

THE SCRAP HEAP

Down the Drain

The resident engineer for Messrs. Mott, May & Anderson, consulting engineers for the Bank Station Travellor installation, which has replaced the subway known as "the drain," was Mr. L. A. Drain.

Sleeper on Track

A main-line train screeched to a stop at Owosso, Michigan, when the driver saw a car parked on the line. The driver, Mrs. Kay Huff, was fast asleep. She explained she must have dozed off, and didn't notice the car had stalled in the middle of the level-crossing.—*From the "Daily Express."*

Language Lessons for Commuters

An original, and probably unique, series of language lessons began earlier this month, when the Norwegian Students Adult Education Service formed an English language class for passengers in the 6.40 a.m. train from Eidsvoll to Oslo. The State Railways provide a special compartment. The teacher brings his own blackboard and chalk.

Mistaken Identity

Mr. Walter Wood, of Leytonstone, was starting his car in the factory yard adjoining Lea Bridge goods yard when two men who had been disturbed whilst attempting to steal a railway van climbed over the wall. They were being chased by railway police and men from the goods depot. Mr. Wood also gave chase, but one of the railwaymen mistook him for a suspect and knocked him to the ground. He was taken to hospital with head injuries.—*From the "Evening News."*

Anglo-Swedish Train Ferry

The editorial note in our September 16 issue, referring to a wagon ferry route over 1,000 miles long between the U.S.A. and Guatemala, reminds a correspondent of a projected North Sea train ferry which never materialised. In 1929, he states, the Swedish State Railways proposed a weekly train ferry service between Immingham, near Grimsby, in Lincolnshire, and Gothenburg, in Sweden. The 500-mile voyage was to take two nights and one day. The service was intended mainly for goods wagons, but the ship would have included passenger accommodation. The project was discussed by the British and Swedish railway authorities for some two years, and then abandoned.

Engineers as Creative Artists

It is difficult to make a bridge look ugly, though this rare feat has been achieved in the viaducts over M1. It was achieved in the last century by the cast-iron railway bridge over the Thames at Charing Cross, London, but I do not think the beauty of a bridge is dependent on its material. . . . For the past century-and-a-half bridges have been regarded almost solely as the job of civil engineers. The railways gave them their

greatest scope and some of the finest bridges in the world were the result—the Maidenhead Bridge for the Great Western Railway by I. K. Brunel, with its flat arches of brick—more daring than and as elegant as the contrasting 18th-century road bridge nearby. Then there is Saltash Bridge, also by Brunel and the Forth Bridge by Sir James Fowler. Robert Stephenson designed the Royal Border Bridge at Berwick, the Britannia Tubular Bridge close to Telford's suspension bridge over the Menai Strait, and the High-Level Bridge at Newcastle-upon-Tyne.—*John Betjeman in "The Daily Telegraph."*

Longevity in the Antipodes

Some locomotives in Australia and New Zealand have long working lines. A correspondent in New Zealand states that a shunting engine, weighing 17 tons, is to be withdrawn from service after 78 years. The 3-ft. 6-in. gauge, locomotive was built in New Zealand, at Christchurch, for the Government Railways, and after long service was sold to a chemical firm in the South Island. The engine is to be presented to the Canterbury Model Engineering Club.

Tall Carriages for Top Hats ?

In an interesting interview in the current number of a railway magazine, a locomotive superintendent of the North London Railway furnishes some welcome information to travellers on that line. "We are building," he says, "all the new passenger coaches six inches higher in the roof." Possibly when the line is fully equipped with these new carriages it will be possible for fair-sized members of the Stock Exchange to travel without running the risk of transforming their silk hats into concertina shape. We regret, however, to see that no hope is held out of wider compartments. In the present

second-class carriages the knees of the opposite passengers almost touch, but perhaps this is part of an ingenious principle to prevent them slipping off the narrow seats.—*From "The Financial Times" of September 8, 1900.*

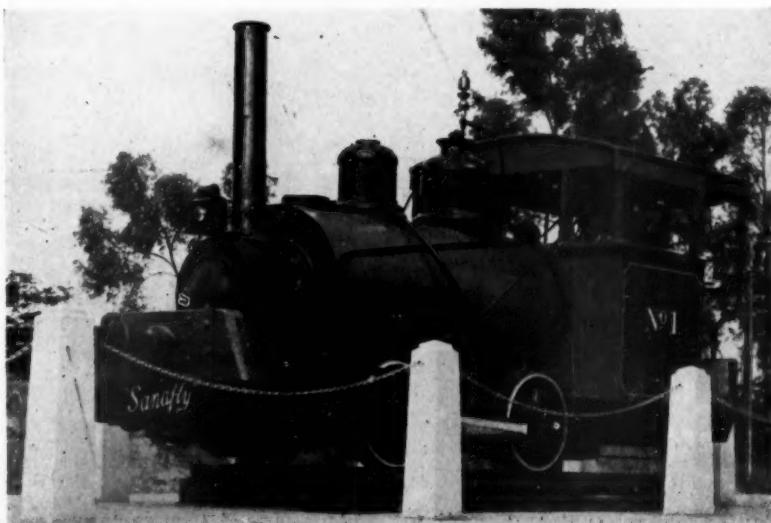
[The article was an illustrated interview with Mr. Henry J. Pryce, Locomotive Superintendent, North London Railway, which was published in the September, 1900, issue of our associated periodical, *The Railway Magazine*.—Ed. R.G.]

Better by Train

In my home town the main station has a bookstall, lavatories, a waiting-room (with a fire in winter) and a tea-bar. The seats aren't comfortable; the tea and food are about the same as that in most canteens. But compare it with the place where I have to go to catch a long-distance bus! . . . Of the buses themselves I claim that I have never sat in any seat that was remotely comfortable. . . . Car travel may give a more comfortable seat than a bus but it is as slow and less reliable in modern traffic. It was an observant advertiser who stuck up those signs on roads approaching the holiday towns. "Next time go by train." It reminds me of Mr. Punch's old lady who always went by train "as nature intended we should."—*Ralph Wightman in the "News of the World."*

Long Service in Northern Australia

The 3-ft. 6-in. gauge 0-4-0 tank engine, *Sandfly*, shown in the illustration was built in 1886 at Philadelphia by the Baldwin Locomotive Company. It worked as a shunter at Darwin, terminus and headquarters of the North Australia Railway, part of the Commonwealth Government Railways system, until 1943. It was recently restored and is now displayed at Port Augusta, in South Australia.



Baldwin 3-ft. 6-in. gauge tank locomotive built in 1886 and preserved at Port Augusta, Commonwealth Government Railways

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

S.A.R. Employs Congo Refugees

Fifteen refugees from the Congo have so far been taken into the service of the South African Railways. These men are employed at various centres as fitters, motor fitters, technical assistants (civil), and draughtsmen.

S.A.R. Savings Policy

Mr. D. du Plessis, General Manager, South African Railways, stated recently in Bloemfontein that although the railways had made an unprecedented recovery from their 1958-59 setback, the stringent savings policy would not be relaxed until the Administration had a reserve of £100 million "safely tucked away." The railways, he said, after exhausting their £9 million reserve during 1959, had ended the financial year on March 31, 1960, with a surplus of £7,736,200. By the end of June they had netted another £1,250,000 to bring the reserve fund to approximately £9 million. Mr. du Plessis said that rail traffic was increasing and during the first five months of this year there had been an overall rise of 6.87 per cent in the tonnage transported. The biggest increases were in citrus, livestock, new motor vehicles, and manganese and chromium ore.

RHODESIA

C.T.C. Panel Commissioned

Rhodesia Railways centralised traffic control panel at Salisbury Station was recently commissioned. Except in the vicinity of Salisbury where local signalling systems have been installed it will eventu-

ally control main-line train movements between Gatooma and Headlands. It was constructed by Associated Electrical Industries—G.R.S. Limited. At present the Lochinvar (Salisbury) to Makwiro section, only, is in operation.

Record Tonnage Carried in 1959-60

In the 12 months up to the end of June this year, Rhodesia Railways carried a total of 11,702,537 tons. This is an all-time record for lines North and East of Bulawayo. The previous record was 11,560,454 in the year ended June, 1958. There was a slight fall in the number of passengers in all classes and the total dropped to 3,524,273 for 1959-60, from 3,864,565 in the previous year. The number of livestock carried rose sharply from 336,431 head to 463,492, which is a record, but is mainly due to the drought conditions prevailing in Matabeleland this year. At the end of June Rhodesia Railways owned 436 locomotives, 39 of them diesels; 657 coaches, and 12,202 wagons.

INDIA

New Railway Hospital in Bombay

Built at a cost of £487,000 by the Western Railway administration in Bombay, a new hospital was recently opened by the Maharashtra Governor. Located near the Central Station it accommodates 150 in-patients and is an all-purpose hospital with departments dealing with specialist services.

Addressing the gathering at the opening ceremony, Mr. Karnail Singh, Chairman of the Railway Board, emphasised that the railways aimed at being model

employers. They were spending some £7,500,000 in the Second Five-Year Plan period on staff amenities, and expected to spend £37,500,000 for staff welfare in the Third Five-Year Plan period. By April next they would have nearly 400,000 houses for railwaymen, 600 primary and middle, and 31 high or higher secondary railway schools, as well as two intermediate colleges. The total number of employees is 1,100,000.

Effects of Strike

The number of railwaymen who did not report for work during the period of the strike from July 12 to 16 averaged approximately 176,000. Over 850,000 man-days were lost. About 1,400 passenger and 8,000 goods trains were cancelled.

Electrification in Sealdah Division

In the Sealdah division, electrically-operated suburban services are likely to be introduced in stages between 1962-63 and 1963-64, provided the replacement of the existing overhead telecommunication circuits with underground cables by the Post & Telegraphs department, and power supply arrangements by the West Bengal State Electricity Board are completed in time.

ARGENTINA

Union Participation in Railway Problems

The first of a series of meetings between the Government and the Unions has been held with the object of defining in what way labour can participate in the rehabilitation of the Argentine railways.

Sabotage to Railway Bridge

A powerful bomb exploded on the bridge which carries the General Belgrano Railway over the General Mitre Railway near Padilla Station in the outskirts of Buenos Aires. Single track working was put into operation until the damage could be repaired.

Buenos Aires Transport Modernisation

Colonel S. H. Bingham, American consulting engineer on urban traffic problems, has paid a short visit to Argentina, at the invitation of Financiera Sudamericana S.A. He is to present a report on the way in which the city and suburban transport of Buenos Aires could be modernised with the backing of the World Bank and international finance.

BRAZIL

Purchase of Locomotives

The Governor of Sao Paulo has approved the purchase by the Sorocabana Railway of 15 diesel-electric locomotives, costing U.S. \$2,100,000. Rede Ferroviaria Federal will use part of its Eximbank loan to finance the import for



Rhodesia Railways C.T.C. panel at Salisbury Station

the Sorocabana, which is the property of the State of Sao Paulo. Eximbank has approved the transaction. In little over two years R.F.F.S.A. has purchased 225 diesel-electric locomotives for the incorporated railways and has placed an order for another 71 units, 17 of which will be charged to the balance of the Eximbank loan and should start to arrive in Brazil this year.

New Incorporated Railway

The E.F. Central do Parana Railway still under construction, was incorporated in the National Railways Department in August and will be joined up with the Parana-Santa Catarina Railway when completed. A line of 373 miles between Apucarana and Ponta Grossa will be realigned, reducing the distance to 211 miles, and the journey from Curitiba to Paranagua, on the Atlantic, will be reduced to 124 miles.

FRANCE

Increase in Couchette Traffic

The number of passengers travelling in *couchettes* on the S.N.C.F. has more than doubled in five years. In second class it rose from 744,000 in 1955 to 1,734,000 in 1959, and in first class from 135,000 to 307,000. At the end of 1961 there will be in service 110 coaches with

first class berths, 247 with first and second class, and 467 with second class berths only.

HOLLAND

Wagons for Hungary

By an agreement between Werkspoor N.V., Peja Producten N.V. of Arnhem, and the Hungarian Nikex organisation, 380 open wagons built in Holland are to be supplied to Hungary at a price of £540,000. Hungarian goods to the same value to be supplied to Holland include wagon parts.

ITALY

Lines Breached by Floods

The Brenner (Verona - Trent - Innsbruck) and Rome-Leghorn main lines were breached by floods last week, as the result of heavy rain, and the Brenner line in addition was blocked by a landslide. Running is reported to have been resumed within three or four days over temporary track and structures.

Further Electrification

With the winter timetable, electric traction has been introduced from October 2 between Venice and Udine, giving a continuous electrified route from Rome to the Austrian frontier at Tarvisio;

electrification now in progress in Austria will extend this to Vienna. Journey times between Venice and Tarvisio have been reduced by up to 40 min., partly by eliminating the change of traction at Udine. Each of the main lines radiating from Venice is now electrified.

DENMARK

New Ferry Service

The two State Railways ferries, *Jylland* and *Kalundborg*, will be joined on the Kalundborg-Aarhus service from October 15 by the new motor ferry, *Prinsesse Anne-Marie*, giving a twice-daily service in each direction. The new vessel will perform the crossing in 3 hr. Connecting trains are run to and from the ports, but the State Railways also hope to attract to this route some of the road haulage traffic between North Jutland and Copenhagen which uses the Little Belt route.

SYRIA

Russian Aid in Building New Line

Technical assistance is to be given by the U.S.S.R. to the Syrian Railways in building the Kamyshli - Aleppo - Latakia line, under an agreement concluded earlier this month between the U.S.S.R. and the United Arab Republic.

Publications Received

S.T.C. Products for World Railways.—Obtainable on request after October 10, 1960, from Standard Telephones & Cables Limited, Connaught House, 63, Aldwych, London, W.C.2.—The products supplied to railways in Britain and many countries overseas by Standard Telephones & Cables Limited range from electric computers to complete installations incorporating extensive equipment. This 116-page illustrated brochure, produced for use at the British Railways Electrification Conference in London on October 3-8, shows their diversity. Only brief technical descriptions are given and the most notable characteristics and advantages pointed out, as technical bulletins and data sheets, available from the firm, describe in detail every product mentioned in the brochure. There are sections dealing with railway telecommunications systems; remote control systems; teleprinters and facsimile transmission equipment; telegraph switching and re-transmission; communication cables; power and control cables; power factor correction; electronic computers and data processing; heat treatment equipment; and rectifier equipment. These are followed by a brief list of S.T.C. components and by a list of the company's agents and associated concerns. The main sections are sub-divided, affording easy reference. In the 40-page section on telecommunication systems, for instance, there are sub-sections giving principal particulars of S.T.C. transmission equipment; train traffic control telephone systems; private automatic

branch exchange, private automatic exchange, private manual branch exchange, and signal post telephone systems; public address and loud-speaker systems; fire alarms; telephone instruments; and telephone apparatus components. The photographic illustrations are well chosen and reproduced. Some of the equipment illustrated is shown *in situ* on British Railways and elsewhere, with indications of the location; this will be particularly helpful to railway officers from overseas who may be visiting Britain.

The Great Northern Line, Autumn, 1960.

—A pamphlet, illustrated with photographs, is being widely distributed to passengers by the Great Northern Line of the Eastern Region, British Railways. Brief reference is made to new diesel services, track improvements and diversions. To maintain the scheduled programme of improvement works, it is stated, work on the track will have to be intensified, but "once the new 3,300-h.p. Deltic diesel locomotives take over passenger running between Kings Cross and Edinburgh towards the end of 1961, cuts in journey time will be the order of the day." There are short notes on achievements since 1957, the year in which the Great Northern Line was formed on re-organisation of the Eastern Region; these include the new tunnels between New Barnet and Potters Bar, introduction of the "Master Cutler" Pullman service, the Bevercotes colliery branch, fitting of A.W.S. to main-line locomotives, and improved punctuality in the London area. A sketch map

shows the main areas of engineering work and diversionary routes on the Great Northern Line.

Standard Classifications and Segregation Schedule for Aluminium and Aluminium Alloy Scrap.—A leaflet issued jointly by the Association of Light Alloy Refiners & Smelters and the National Association of Non-Ferrous Scrap Metal Merchants gives Standard Classifications and a segregation schedule for aluminium scrap. It is intended for those concerned with the fabrication or machining of products made of aluminium alloys, as careful segregation of the resultant scrap can much enhance its saleable value. Copies are available from the Association of Light Alloy Refiners & Smelters, 3, Albemarle Street, London, W.1.

David Brown Corporation Facts and Figures.—Outlines of the activities of the David Brown Corporation Limited since the organisation was founded 100 years ago, is given in a leaflet obtainable from David Brown Publicity Services, Meltham, Huddersfield, Yorks. As to railways, brief reference is made to specialisation by the company in products such as gearboxes and final drive axle units for diesel, diesel-electric, and diesel-hydraulic locomotives; to hypoid, spiral bevel and worm gear units for railcars, urban underground railway cars, and to helical and spiral bevel final drive units for passenger and goods locomotives. Mention is made also of the David Brown industrial tractor specially equipped for shunting railway vehicles.

Travolator Installation at Bank Station

Construction of moving platform connecting Waterloo & City line platforms with a new booking hall



Twin Travolators viewed from platform level

THE original access from the platforms of the Waterloo & City line, British Railways, Southern Region, to the high-level circulating area at Bank Station consists of a subway some 340 ft. long and 13 ft. wide inclined at 1 in 7.4, the gradient being reduced to 1 in 14 by the inclusion of a group of five steps at 40-ft. intervals.

In 1939, Parliamentary powers were obtained and a scheme was authorised for the construction of a three-way escalator and a low-level subway giving direct access to the London Transport Executive platforms, but the outbreak of war prevented the work being put in hand. The matter was again considered in 1950, but because of the need for economy at that time, the scheme had to be left in abeyance.

It was again revived in May 1955, when authority was obtained to engage a firm of consulting engineers to develop an up-to-date scheme. After considering the various systems available, it was finally decided to install a Travolator based on the normal escalators used by the L.T.E. but having a flat platform instead of the usual steps.

Advantages of Scheme

The Travolator proposal had the further advantages that passengers would be conveyed a greater distance towards their destination than by escalators; the existing subway would be permanently retained for use both during construction and subsequently; construction would be carried out with far less interference to passengers; and the line of the Travolator tunnel would cause less interference with existing drainage and services than that envisaged in the original proposals.

The scheme which was finally approved

in March, 1957, covered the following works:—

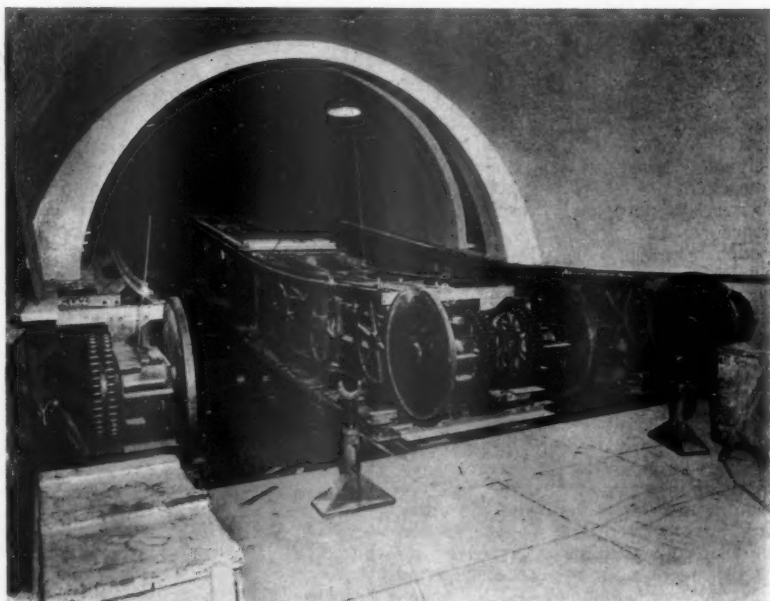
- (a) The construction of a tunnel of 16 ft. 6 in. internal diameter opposite platform No. 2, running approximately parallel to the existing subway, housing two Travolators, each 4 ft. wide, with a machinery room and substation chamber.
- (b) The construction of six openings 9 ft. wide, in the walls separating platforms 1 and 2, to facilitate the flow of passengers from No. 1 platform to the base of the Travolator.

- (c) Substitution of the existing timber platforms by concrete, platform levels being raised 2½ in. to make them 1 ft. 8 in. above rail level.
- (d) Re-lining of platform tunnels and the existing subway including the installation of a false ceiling to take lighting cables, and provide drainage for seepage water.
- (e) The diversion of all existing drains, cables, and public services necessitated by the works.
- (f) The reconstruction of the high-level subways leading to Walbrook and Poultry, including a new ticket office and the provision of certain staff amenities.

Operating Speed

The Travolators have been developed in this country by the Otis Elevator Company from its escalators in regular service with the London Transport Executive. At their maximum speed of 180 ft. per min. (2.04 m.p.h.) each is capable of carrying approximately 10,000 passengers an hr. up an incline of 1 in 7 which is more than ample to clear the arrival platforms before the arrival of the next train. The actual speed adopted will be the subject of trial and error.

It is the intention to run both Travolators in the same direction during the morning rush hour traffic, one being run in each direction during the rest of the day. Also, to reduce wear and tear during the quieter periods, speeds will be controlled by photo-electric cells indirectly operated by passengers, moving on and off the Travolators. The idling speed of 90 ft. per min. will be increased



Lower end of Travolator, showing chain drive

to normal running speed while passengers are in transit. The existing subway, relined and redecorated, and with the hand rail replaced centrally in the passageway, will be available at all times as an alternative. Arrangements for stopping the Travolators in an emergency are similar to those on escalators.

The two Travolators are of a heavy duty railway type, designed for ascending and descending traffic and are the first of their type in the world. The main feature of the system is that it uses a continuous flat platform travelling at a lower angle of incline as compared with the articulated step formation of an escalator which is normally 30 deg.

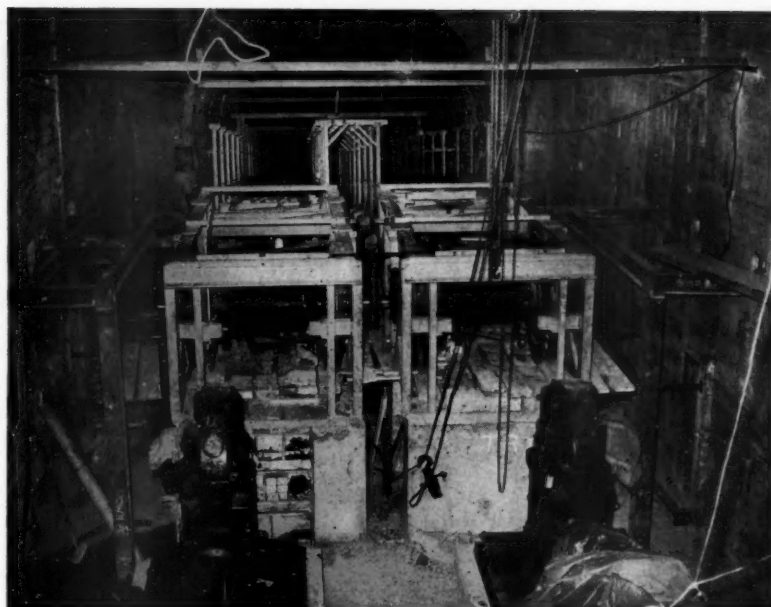
The Bank installation has an incline of 1 in 7, the length of the incline portion being 296 ft. 11 $\frac{3}{8}$ in. Vertical rise is 42 ft. The overall length including the horizontal portions at the upper and lower landings available for passenger loading is 312 ft. 5 $\frac{3}{8}$ in. x 40 in. in width, which tapers out to 48 in. at a point just below the handrails.

Drive Unit

Each Travolorator has its own drive unit located in a motor room beneath the upper landing and consists of a worm-gear machine, electro-magnetic brake and variable-speed three-phase commutator motor of 85 h.p. The worm gear is of high efficiency with multi-start worm which is connected to the motor shaft by a large diameter coupling which also forms a brake drum, the brake being spring applied and magnetically released. The brake is designed to stop the Travolorator smoothly under all conditions of load and speed. The motor is continuously rated and of the Schrage type with pilot-motor-operated brush gear.

The starting and stopping of each Travolorator and its motor is performed through an individual automatic magnet operated control gear of the contactor type mounted in a steel cubicle with hinged doors at the front. The control gear is designed to start and run its Travolorator in either an ascending or descending direction at maximum speed or an intermediate speed down to 90 ft. per min. for passenger traffic and a crawl speed of 36 ft. per min. for inspection and maintenance.

In addition to usual starting contactors, overload devices and so on, each controller embodies switches for operating the service brake on the drive machine and the pilot motor controlling the main



Machinery being installed below top landing of Travolorator

motor brush gear. All magnets operate from a d.c. supply obtained from a rectified a.c. supply. Up-down buttons are fitted for local control. Five emergency switches are fitted on the balustrade deck panelling between the two Travolorators. One switch is located at each of the upper and lower landings and the other three switches are spaced at intervals on the incline.

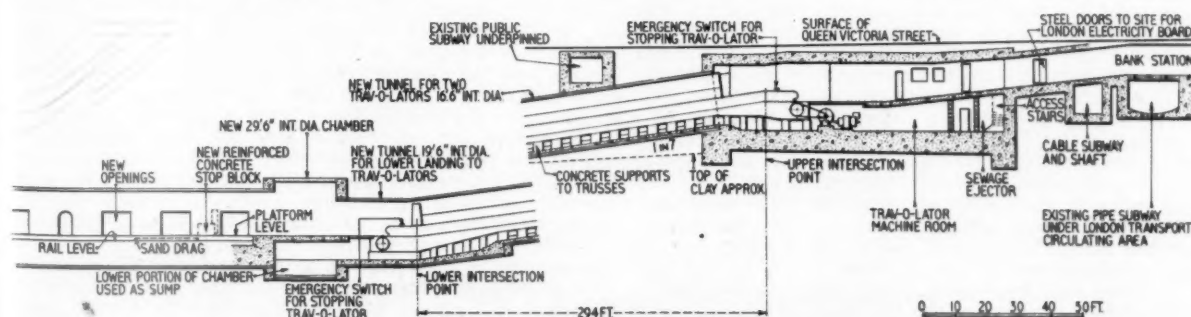
Assembly of Platforms

The moving platforms each 40 in. x 16 in. are connected together and driven by two roller chains assembled in matched lengths thus ensuring that they are not out of square with one another and that chain stretch is maintained within reasonable limits. There is one chain on each side of the series of 'moving' platforms so that the latter form one continuous unbroken length. At the upper and lower landings just beyond the toothed combs and beneath the fixed floors are located pairs of sprocket wheels over which the chains pass. These sprockets are carried on shafts running on roller bearings. The one at the upper landing end receives the drive from the motor and its reduction gear through a duplex roller chain and associated sprockets.

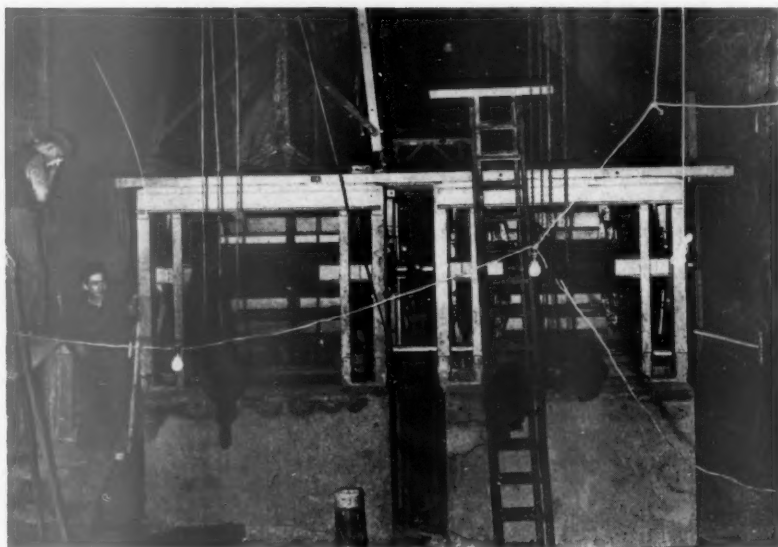
It also carries the disc-type emergency brake, the function of which is to bring the platform to rest in the event of breakage of the drive chain between the machine and the Travolorator.

The pair of sprockets at the lower landing end are mounted in a horizontally movable frame carried on rollers and fitted with a device for maintaining the correct tension on the step chains and ensuring proper engagement of the chain links with the teeth of the sprocket wheels.

Each Travolorator has two moving handrails constructed of cotton duck and rubber with a continuous steel tape designed to reduce stretch to a minimum. Handrails are separately driven at the upper landing newel wheel from the main drive shaft by a single roller chain. At the lower landing the drive of each handrail is by two driven wheels, the newel wheel and the intermediate wheel, the former being driven by a separate chain from the intermediate wheel sprocket. Each handrail has a tensioning device at the lower landing to ensure adequate adjustment and tension under varying conditions of loading. The tracks or guides on which the handrails run on the passenger side are of bright



Part elevation of Travolorator, showing location of machinery room



Travolator foundations in machinery chamber

drawn steel of special section to minimise undue friction and the rate of wear.

The handrails on the return side are supported at intervals by a series of ball-bearing phenolic rollers arranged in an arc and mounted in supporting steel frameworks attached to the balustrade supports. Each series of rollers has a device for obtaining the appropriate initial handrail adjustment.

Each moving platform consists of 488 individual platforms, the surface being of special quality aluminium with close spaced cleats embodying a feature to avoid a continuous gap between adjacent platforms. The platforms ride on four ball bearing wheels of phenolic and canvas materials. The wheels are of ample diameter and wide tread to provide durability and comfort in riding.

The moving platform wheels run on tracks forming the contour of the Travolator and are so designed to confine side movement within narrow limits.

Safety Factors

Each platform is designed for intensive service with an adequate factor of safety based on a working load of two passengers or 300 lb. every 4.45 sq. ft. of the overall area available for passenger loading. The Travolators are carried by individual main frames of structural steel which in turn are supported on substantial concrete foundations extending the whole length of the incline and horizontal portions, the framing at the upper and lower landings also serving to carry a portion of the adjacent floor.

Various safety devices are installed including a centrifugal type of excess speed governor, broken chain devices, and broken handrail switch. Warning light indicators are located in the machine room to give visible indication when the broken chain devices are nearing a point when they will operate. A series of floor plates have been installed over the Travolator trusses at each landing. These plates are in the form of trays of steel construction with bronze edging and

filled with black rubber tiling. Beyond these floor plates a series of floor covers of somewhat similar construction have been installed.

The panelling throughout is constructed of double armoured plywood, the non-visible side being galvanised sheet steel and the other side aluminium.

Construction Work

Work, which started in June, 1957, necessitated the closing of the subways leading to Walbrook and Poultry. A shaft situated between these two entrances was driven down to the level of the Travolator tunnel, from which point an 8 ft. dia. pilot tunnel was driven down the incline, and subsequently enlarged to 16 ft. 6 in. dia., cast-iron segmental linings being used in each case, the joints being caulked with lead. Excavation carried out by hand, was hoisted out at road level and removed by lorry until the line of the existing low level siding tunnel was reached, when it became possible to remove spoil by wagons, under night possession, via Waterloo, where the wagons were brought to the surface by the Armstrong lift.

At the lower end, the 16 ft. 6 in. tunnel, which has an overall length of 282 ft. is enlarged to 19 ft. 6 in. dia. for a further 52 ft., to accommodate the lower landing and return machinery. Beyond this point, a further enlargement to 29 ft. 6 in. occurs for a distance of 19 ft. 9 in. to provide a circulating area for passengers at the foot of the Travolators and the existing subway.

Concurrently with this work, six new openings, each 9 ft. wide, were cut in the dividing wall between the two platforms to facilitate the flow of passengers from No. 1 platform towards the base of the Travolators. Extensive shoring of the existing platform tunnels was installed to prevent their deformation. The machine chamber and booking hall at the upper end of the tunnel is approximately 100 ft. long, 35 ft. wide, and 30 ft. deep. A reinforced concrete raft was

built as a foundation for the perimeter walls and the machine beds. To keep the interference with vehicular traffic and the movement of passengers to the minimum, the construction of the walls was carried out in a series of headings driven round the sides of the chamber. The dumping and excavation for the floor were then removed, and the reinforced concrete floor constructed in strips as the excavation proceeded. The whole of the area of the booking hall and machine chamber was completely tanked with 1½ in. asphalt applied hot.

The depth of the reinforced concrete roof slab varies from 3 ft. 6 in. to 1 ft. below the road surface and was constructed in strips approximately 8 ft. wide in open trench, the road traffic meanwhile being carried on temporary steel decking.

While it was generally possible to divert most of the cables and other public services by trenching in the roadway, without interference to road traffic, a 5-ft. dia. sewer crossing the booking hall area presented a special problem. This was diverted from its original site by tunnelling from a shaft at Bucklersbury, a new 5-ft. dia. drain formed of cast-iron segments lined with concrete and with an engineering brick invert. An additional pipe subway with a new shaft had also to be constructed under the London Transport Executive main concourse at Bank Station. In addition to the various public authorities' mains below street level, the L.T.E. main feeder track cables which were originally sited in the invert of the Poultry and Walbrook subway, had to be diverted into the invert of the upper portion of the existing subway to connect again with the portion housed in the circulating area.

Ventilation and Lighting

An electric fan in the machine room passes air through the Travolator pit for cooling purposes, the air normally being discharged at ceiling level in the ticket hall. The fan is reversible to allow the flow to take place in either direction. Subsidiary ventilation is also provided in the staff mess room and lavatory below the ticket hall.

In the Travolator tunnel continuous fluorescent trough lighting is installed at deck level, with a central trough of fluorescent lighting in the ceiling at the foot of the tunnel. On both platforms the original tungsten lighting has been replaced by fluorescent strip lighting immediately above the platform edges, and similar fluorescent strip lighting replaces tungsten lights in the existing pedestrian subway.

The scheme was developed and the whole of the work designed and carried out by Mott Hay & Anderson, the Consulting Engineers, under the general direction of Mr. A. H. Cantrell, Chief Civil Engineer, British Railways, Southern Region. The contractor for the tunnelling and general engineering work was Mitchell Bros. Sons & Co. Ltd., and the contractor for the supply and installation of the Travolator was the Otis Elevator Company.

Body Rolling as Influenced by Bogie Suspension—2*

Considerations of design variables affecting the angle of roll of bogie vehicles

By J. L. Koffman

THE effective length of the swing links should be considered in terms of the natural frequencies of lateral (ω_s) and nosing oscillations, as well as swaying (ω_o) (4). The importance of link length in relation to the latter mode is often overlooked and the resultant unpleasant manifestations are very difficult to correct. Frequently, the use of relatively long links is desirable to reduce the sensitivity of the suspension to lateral track irregularities and to achieve a low natural frequency of the lateral and body nosing oscillations.

The use of long links ensures a low degree of coupling between lateral and roll oscillations, this being of benefit as far as swaying is concerned. Experience with some highly stressed helical bolster springs failing in service due to stresses imposed by vertical and lateral oscillations made it desirable to couple the top and bolster planks laterally. This practice is now acquiring the reputation of a universal recipe, but it must be mentioned that the lateral flexibility of suitably stressed helical bolster springs can provide welcome assistance in reducing the lateral frequency of a secondary suspension incorporating short swing links.

Lateral Displacement

Particular attention must be paid to lateral displacement for this is determined by the effective link length and the lateral force. With the latter attaining magnitudes of 0.1W, the lateral displacement at the small link angles considered here will be equivalent to 0.1l, where l is the effective link length.

Thus, with $l=20$ in., allowance must be made for a lateral displacement of 2 in. This must be considered against the limits set to the combined lateral and roll displacement and it might be found that, because of this, lateral displacement must be reduced. In this case, a solution is often sought by providing rubber stops between bolster and bogie frame which, while reducing displacement amplitude, might result in unpleasant impacts causing further rolling of the body particularly on soft springs.

Bolsters Pre-loaded Laterally

Another solution consists in pre-loading the bolster laterally, the centering springs action increasing usually in direct proportion with the displacement, a feature found with leading bogies of steam locomotives and some modern bogie electric locomotives. Nevertheless, if the centering devices are required to act immediately lateral displacement takes place, their action results in increasing the natural frequency of the assembly.

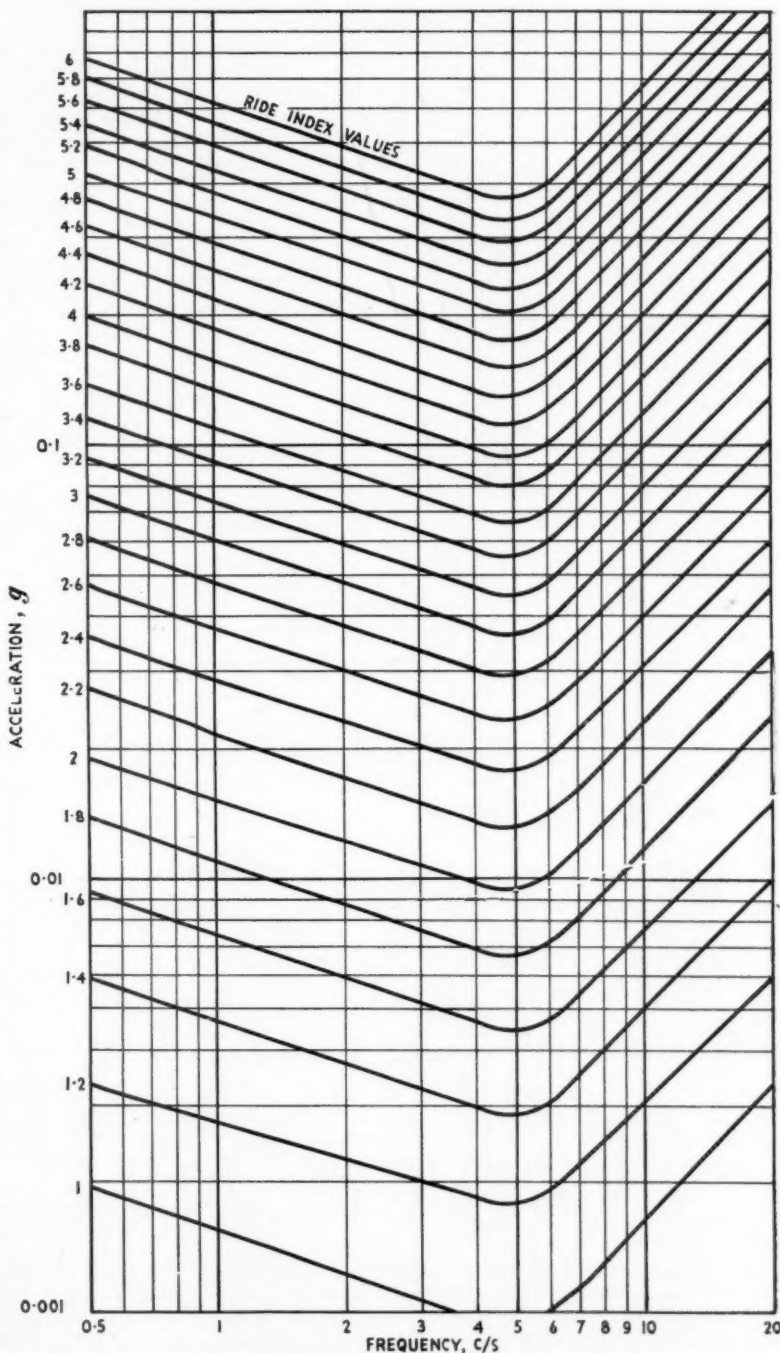
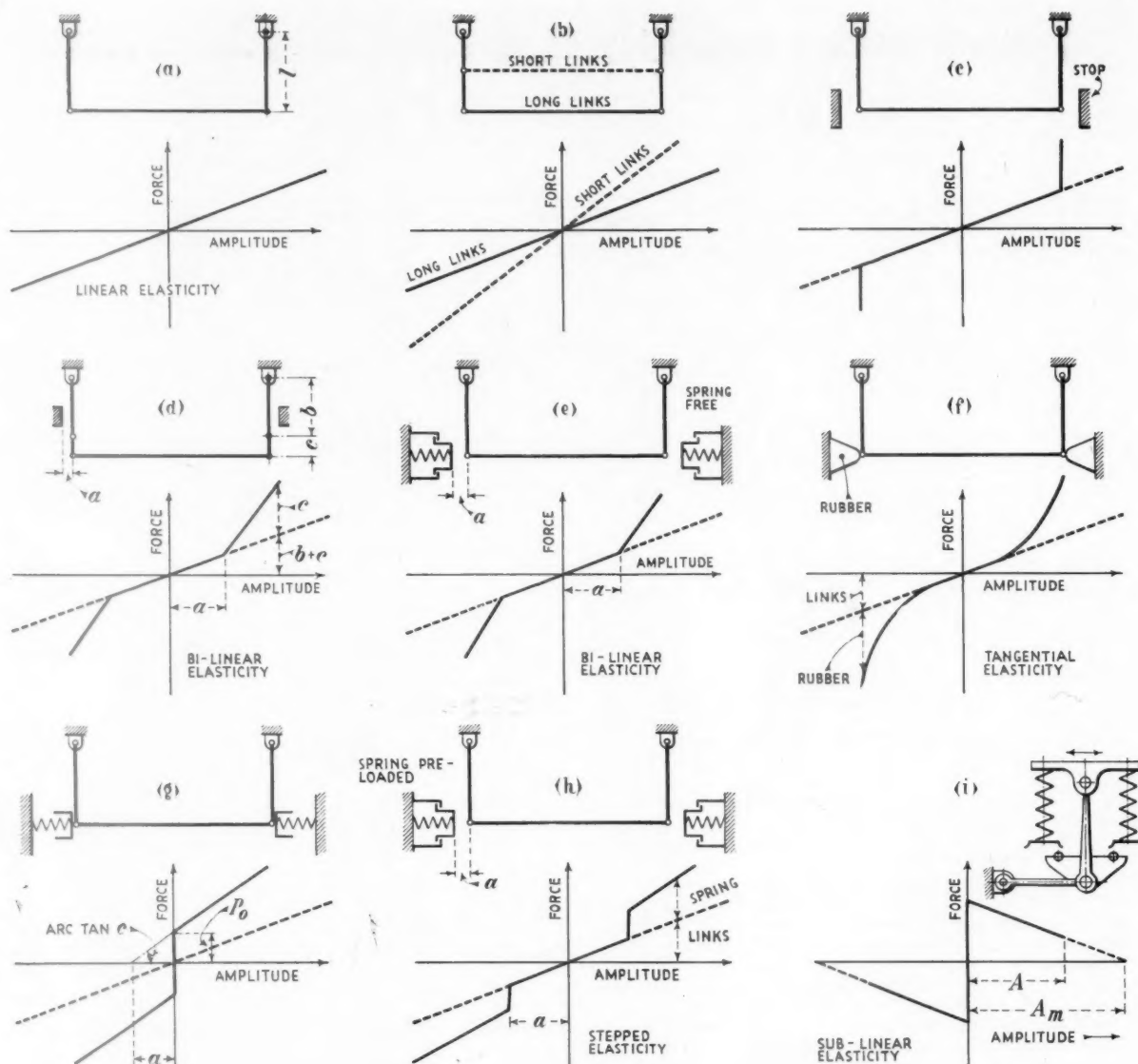


Fig. 2—Lateral ride index values as a function of accelerations and frequencies

This means that the suspension ceases to act as one incorporating long swing links, the effective link length being now represented by the combined action of

links and centering springs. The relevant action is referred to in Fig. 3. Here, vertical swing links supported on knife edges are assumed throughout. The

*Part 1 appeared in our September 16 issue



$$\omega = 2\pi f^* \text{ [1/RAD.]} \quad (a) (b) (c) \quad \omega = \sqrt{g/l}$$

(d) (e) SEE FIG. 4 REF. 7 (f) SEE TEXTS BY DEM HARTOG OR TIMOSHENKO, ETC.

$$(g) \quad \omega_l = \sqrt{c/m}, \quad c = \text{SPRING STIFFNESS}, \quad m = \text{MASS} \quad \frac{\omega_l}{\omega_t} = \frac{\pi/2}{\text{ARC COS } \frac{1}{1+A/a}}$$

$$(i) \quad \omega_l = \sqrt{c/m} \quad \frac{\omega_l}{\omega_t} = \frac{\pi/2}{\text{ARC COSH } \frac{1}{1-A/A_m}} \quad \omega_t = \text{OVERALL FREQUENCY AT AMPLITUDE } A$$

Fig. 3—Characteristics of bolster control systems

natural frequency of such 20-in. long links acting as a pendulum is: $f_c = (1/2\pi) \sqrt{g/l} = 1/6.28 \sqrt{386/20} = 0.703$ [c.p.s.]

The natural frequency of the body nosing or hunting about the vertical axis through the centre of gravity is:

$$f_n = \frac{a}{2\pi} \sqrt{\frac{c_l}{I}} \text{ [c.p.s.]}$$

where $2a$ [ft.] is the distance between the bogie centres, c_l [lb. per ft.] the lateral centering force imposed on the body by

both bogies and I_z [lb. ft. sec.²] the moment of inertia of the body about the vertical (Z) axis.

British Railways Coach Example

For the British Railways # coach, $2a = 46.5$ [ft.] and $I_z = 670,000$ [lb. ft. sec.²] while with the body weighing 46,900 [lb.] $c_l = 46,900 \times 12/20 = 28,200$ [lb./ft.]. Consequently $f_n = (23.25/6.28) \times \sqrt{28,200/670,000} = 0.76$ [c.p.s.].

The use of 20-in. long links requires

a lateral displacement of 2 in. if forces equivalent to 0.1g. are to be allowed for. If loading gauge and roll considerations require that the lateral displacement should be limited to 1 in., then 10-in. long links or longer (20 in.) links with additional spring-centering devices must be used.

As long as the force-displacement characteristic is represented by a straight line (Fig. 3b), the result for the above example and $l = 10$ in. will be the same

regardless of the means used, i.e., $f_l = 0.995$ [c.p.s.] and $f_n = 1.09$ [c.p.s.]. This will mean a greater sensitivity to the effect of lateral track irregularities and resonance with the sinusoidal wheel motion at lower road speeds. The desirability or otherwise of such a move must be carefully considered particularly in terms of body nosing, swaying, and lateral ride index values (Fig. 2 (1)).

Articulated Links

Another possibility would be to divide the 20-in. long swing links so as to make them act as a single long link displaced through, say, $\frac{1}{8}$ in. After that, the upper link, which can be about 15½ in. long, comes up against a stop, and the body is permitted to swing on the lower section only (articulated links). In this way, suspension will benefit by the use of lower links as long as the displacement does not exceed $\frac{1}{8}$ in., Fig. 3d.

As shown on Fig. 4 of Ref. 7, with $c_{l-5}/c_{l-0} = 4.5$ approximately, at full amplitude the frequency will be increased to 1.5 times that obtained with 20-in. long links. The lower natural frequencies will be maintained as long as the upper link section does not come up against the stops.

A more gradual reduction of the effective link length can be achieved with the aid of rubber units provided between bogie frame and bolster. As some of these units have a very flat force-displacement characteristic at least for the first $\frac{1}{8}$ in. or so of the compression stroke, they can be installed in contact with the bolster (Fig. 3f). It will be desirable to accommodate such units between the bogie frame and lower bolster plank as this is not subjected to vertical oscillations relative to the frame, thus avoiding abrasion being applied to the rubber elements.

The resonance diagram of this centering arrangement with its non-linear characteristic can be readily evaluated graphically (8). If springs are used to assist the centering force provided by the swing links, the resultant characteristic will be as indicated in Fig. 3e, where the springs come into action only after the body has moved through a distance a to each side of the centre line or, as shown in Fig. 3g, which is valid for pre-loaded springs, the body being unable to move until the fore P_0 is exceeded.

Alternatively, the centering springs can be arranged to act only as soon as the displacement amplitude exceeds the distance a , the centering force then suddenly increasing (Fig. 3h). Such an arrangement is less attractive, as the action will be more or less erratic, depending on the value of a .

Swiss Practice

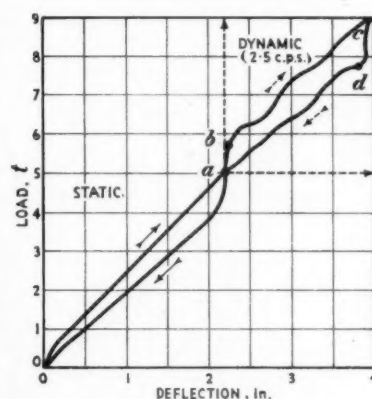
It is also possible to design the centering devices to ensure an opposing force decreasing with the amplitude (Fig. 3i). A representative design was used with some 1Dol Gothard locomotives (9). In this case, the natural frequency of the system is obtained from the equation (Fig. 3 (10)). The values of the hyperbolic function \cosh can be obtained from engineering or mathematical handbooks.

It is of particular interest that, while with centering devices ensuring linear force-displacement characteristics the frequency is constant and independent of the amplitude, with non-linear devices the frequency depends on the amplitude.

With some modern bogies, the lateral restoring forces have a non-linear characteristic with a single change of the force-displacement incidence (Fig. 3d) achieved by the use of articulated swing links. Among designs making use of

this feature are the Minden-Deutz, München-Kassel, F.S., East German, and U.S.S.R. standard coach bogies as well as some S.N.C.B. Bo-Bo electric locomotive bogies.

Other designs are also used with British Railways railcar bogies, both diesel and electric. With some of the former, an increase in the effective swing link length and the introduction of rubber cones with a characteristic as shown in Fig. 4 have resulted in marked improvement of the riding qualities in the lateral plane. In fact, the previous ride index of about



Courtesy of]

[Dr. Ing. A. D'Arbela

Fig. 5—Load deflection characteristic of a laminated spring

3.25 was reduced to about 2.5 to 2.7, thus improving the ride qualities from just about "satisfactory" to "almost good." This substantiates the results of previous theoretical assessments (1) leading to the modifications concerned which were immediately successful as they were based on logical thought rather than on a search for solutions on the basis of recipes.

Action of Laminated Springs

The pattern of body rolling and swaying oscillations can be complicated by bogie pitching encountered with helical springs at the primary and secondary suspension. With laminated springs, passage over rail joints does not usually excite quite so pronounced pitching. The resultant oscillations, while continuously present, were of a random character and the usually heavy friction damping kept the amplitudes of spring deflections small. On the other hand, the erratic nature of the dynamic force-displacement characteristic makes a reliable determination of the natural frequency of pitching difficult.

An important aspect of the action of laminated springs is shown in Fig. 5. The load-deflection characteristic was determined in the usual way up to a load of 5 tons. Above this load the characteristic was determined at a superimposed frequency of 2.5 c.p.s., the marked change being due to the action of friction and inertia. Thus, while under steady load, the spring stiffness was 2.3 tons per sq. in.; under dynamic load it increased to 10.4 tons per sq. in. at a-b and c-d.

It may be recalled that symmetrical

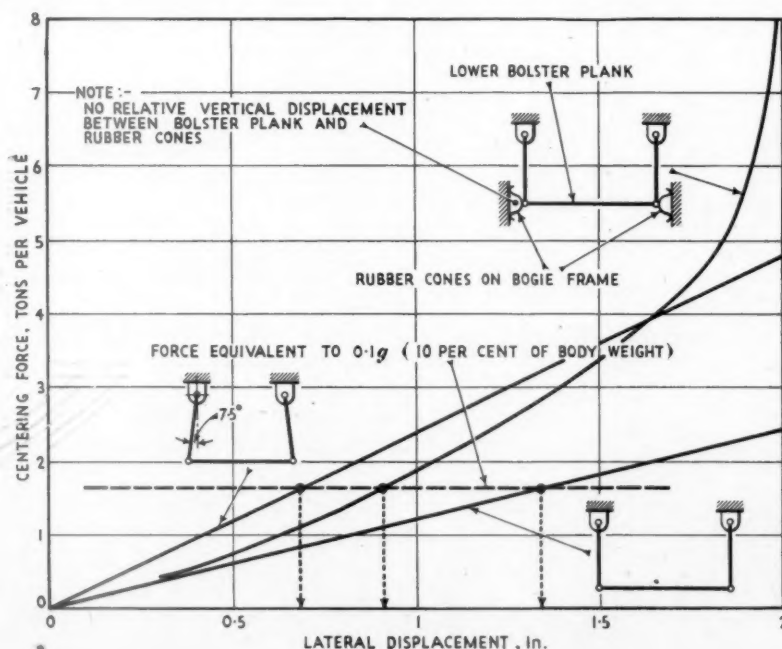


Fig. 4—Effect of swing link length and rubber components on centering characteristics of a railcar trailer bolster

bogies pitch about a lateral axis approximately through the centre of gravity of the complete bogie (or slightly above this), the natural frequency being:

$$f = \frac{1}{2\pi} \sqrt{\frac{c_a}{I}} \text{ [cycles per sec.]}$$

where I [ft.] is the bogie wheelbase or distance between springs with Pennsylvania or similar bogies, c_a [lb./ft.] the spring stiffeners of all axlebox springs of the bogie and I [lb.ft.sec.²] the moment of inertia of the sprung portion of the bogie about the lateral axis through the centre of gravity.

Analysis of road tests and calculations as well as experimental determinations of the moment of inertia suggest that:

$I = x m_1 l^2 / 12$ [lb.ft.sec.²]
where $x = 1.35$ to 1.5 , and m_1 [lb.sec.²/ft.] is the mass of the sprung components. The value of c_a must include the vertical component due to quill drives incorporating torsionally resistant components.

Thus, for an electric locomotive bogie with $c_a = 396000$ [lb./ft.] without the quill drives, increasing to $c_a = 772000$ [lb./ft.] due to the drives, $f = 7.15$ [c.p.s.]. Actual measurements (Fig. 6a) show this to be about 7 [c.p.s.] at the non-drive axlebox. Continuous oscillations at the

natural frequencies were present at all speeds above about 25 m.p.h., the amplitudes increasing up to resonance at:—
 $V = 2fl/1.467 = 2 \times 7 \times 10/1.467$
 $= 95$ [m.p.h.]

Swaying Oscillations

The swaying oscillations indicated by the bolster spring deflections being in step with the lateral displacement of the swing links are also shown in Fig. 6a. The amplitudes due to sway do not exceed about ± 0.5 in., but these are further increased to about ± 0.85 in. by the excitation emanating from bogie pitching. Roll is thus increased at pantograph level in this case from 1.6 in. to 2.7 in., while the spring stress of about 35 [t. per sq. in.] under static load is increased to 40 and 43.5 [t. per sq. in.] respectively.

The records Fig. 6b also refer to a locomotive with helical springs throughout, whilst those of Fig. 6c were obtained with one using laminated springs only.

It will be noted from these considerations that further clarification regarding the lateral displacement of vehicles is desirable with particular reference to loading gauge and overhead limitations. These investigations should be carried out with the aid of accelerometers at

floor and roof level, displacement transducers provided to record vertical oscillations of primary and secondary springs, and the lateral oscillations of the bolster relative to the bogie frame and the body and bogie frame relative to the axleboxes or wheels and the lateral motion of the wheels relative to the rails. In addition, the lateral motion of the pantograph relative to the overhead should be recorded with the aid of contact strips on the pan. Such investigations require time but they should be carried out to provide clarity with regard to an obviously somewhat complex problem.

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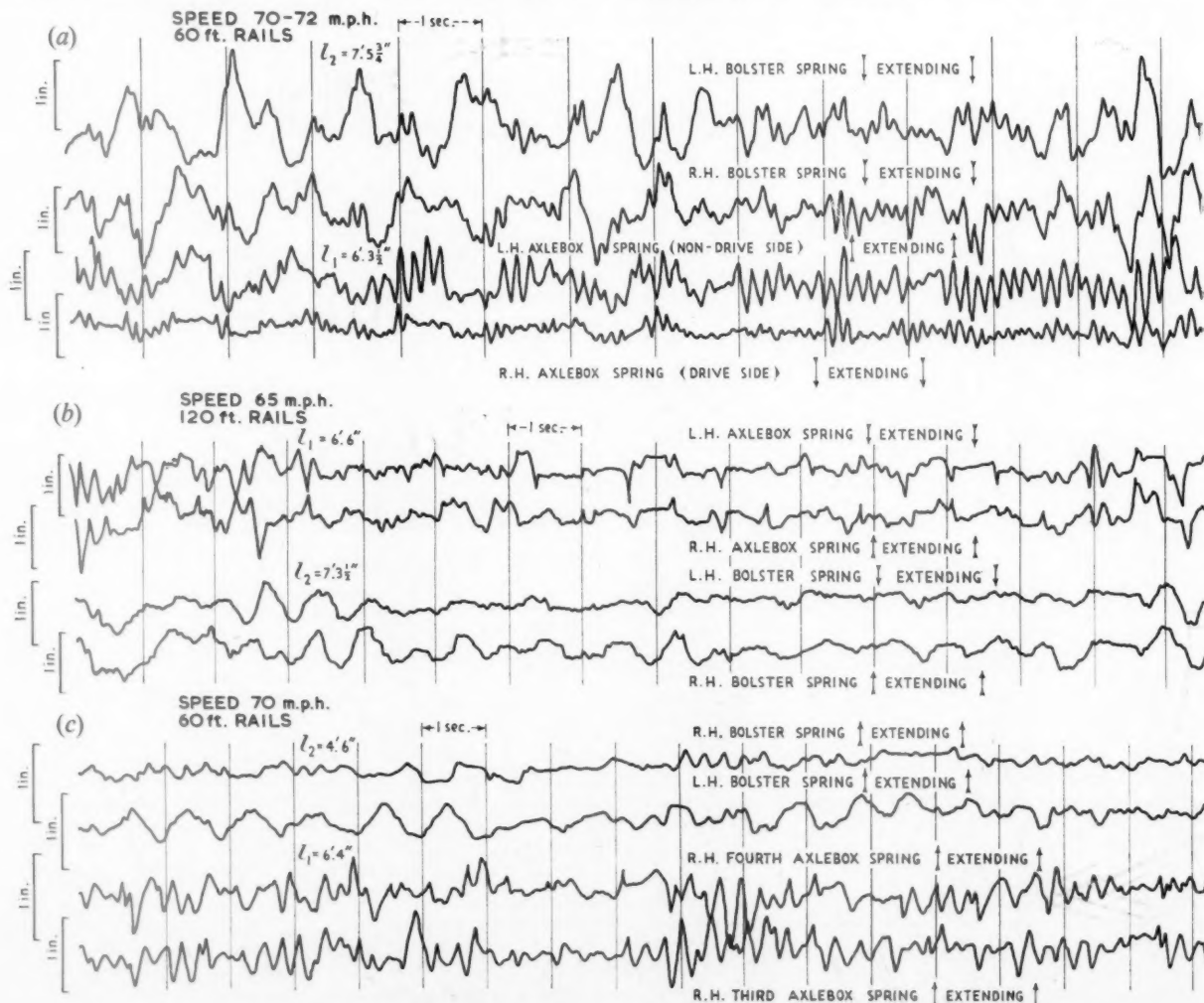


Fig. 6—Primary and secondary spring oscillations of Bo-Bo electric locomotives with quill drives

New Cars for East Coast Route Pullman Trains

Replacements for stock of locomotive-hauled trains incorporate new design features and entirely new decor



The "Master Cutler," including four of the new Pullman cars, hauled by English Electric diesel-electric locomotive

THE first of 44 Pullman cars built by the Metropolitan Railway Carriage & Wagon Co. Ltd. for service in the Eastern, North Eastern, and Scottish Regions of British Railways began regular running on September 28 in the "Master Cutler" between Kings Cross and Sheffield Victoria via Retford. The "Master Cutler" is the first new locomotive-hauled Pullman train to be built since 1951.

Delivery of new cars is to Doncaster Works, Eastern Region. The order was placed in accordance with a replacement programme for cars working in the "Master Cutler" the "Yorkshire Pullman" (Kings Cross—Leeds—Harrogate), the "Tees-Tyne Pullman" (Kings Cross—Darlington—Newcastle) and the "Queen of Scots" (Kings Cross—Leeds—Newcastle—Edinburgh—Glasgow). All these trains are composed exclusively of parlour, kitchen cars or brake cars of the Pullman Car Co. Ltd.

The programme provides for cars as under:—

Class	Description	Seating	No. of cars
1st	Parlour	24	8
1st	Kitchen	20	13
2nd	Parlour	42	7
2nd	Kitchen	30	15
2nd	Bar car	24	1
		Total	44

Standard Structural Features

For purposes of standardisation, all 44 cars have been built with the same contour and structural features. These are standard on British Railways. The exteriors are painted in the traditional Pullman colouring of umber and cream, with the company's new coat of arms on the lower panels.

The principal dimensions are as follow:

	ft. in.
Length over vestibule ends	64 6
" " body ends	57 9½
" " bogie centres	46 6
" " bogie wheel base	8 6
Maximum width of body over panels	9 0

Besides serial numbers the first class cars have been given names:

First class kitchen cars (schedule nos. 311–323): *Eagle, Falcon, Finch, Hawk, Heron, Magpie, Raven, Robin, Snipe, Stork, Swift, Thrush, Wren*

First class parlour cars (schedule nos. 324–331): *Amber, Amethyst, Emerald, Garnet, Opal, Pearl, Ruby, Topaz*

Second class bar car (schedule no. 354): *The Hadrian Bar*

Second class cars have numbers only, shown on the body sides. The 15 second class kitchen cars are schedule nos. 332–346, and the seven second class parlour cars are nos. 347–353.

The cars are equipped with the Commonwealth bogie incorporating a monobloc cast-steel frame and using Timken roller bearings and axle boxes.

Wide Windows

The windows are 5 ft. long, compared with 4 ft. in older cars. The lower portion is double-glazed and the upper portion equipped with sliding lights which have hinged vanes to assist in air

extraction. The windows are a separate unit mounted in an aluminium alloy frame, the joint between this frame and the outside body panel is made with Claytonrite rubber moulding. They were constructed by Hallam, Sleigh & Cheston Limited. Kitchen windows were supplied by the Triplex Safety Glass Co. Ltd.

Pressure Ventilation

The Stone pressure ventilating and heating system delivers fresh air drawn from outside the car. The air is heated by passing over steam ducts or, alternatively, electric heating elements; the method used depends on the type of heating medium supplied. The temperature of the air is thermostatically controlled. It is delivered at low pressure through slots at about floor level and is extracted through the sliding ventilators or, if these are closed, through an aperture which surrounds the frame containing the ceiling light panels.

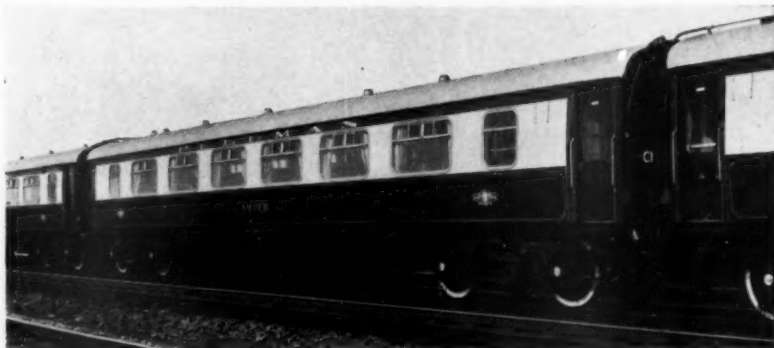
The main lighting of the saloons is by fluorescent tubes; the main supply is by the normal 24/32-V. train lighting generators and batteries and is stepped up by transistor invertors to 80V. 4½ kc/s. with a suitable starting circuit for fluorescent tubes.

The ceiling light panels consist of an aluminium frame with translucent corrugated perspex. Each panel measures 4 ft. x 2 ft. 8 in., and is lit by one De Luxe warm white fluorescent tube. Although there are only eight or nine such panels in the whole of the car the general lighting gives an intensity of 15 ft. candles at table level. In addition, ordinary tungsten lighting is provided by lamps under the luggage racks, on the partitions, and at the tables themselves.

The main lighting in the kitchens and pantries also is fluorescent.

Special attention has been given to the layout and fittings of the toilets. A new style of wash basin is mounted in a cabinet. The walls of toilet compartments are lined with laminated plastic panelling.

Luggage racks run the length of each saloon. They are semi-solid, made



Exterior of parlour car, showing wide windows

of Lanide covered with an open grille in alternating sections. The upper of the two racks is for luggage, and the lower smaller rack for lighter articles.

The outer ends of the tables stand away from the body side by some 3 in. In the space left a rack is provided for papers, magazines, and so on.

Folding Table Flaps

Tables where there are two chairs abreast, e.g. in coupés, include a special folding flap. Each passenger has an individual flap and this, when not required, can be folded under the table, giving more leg-room. A table can be prepared for a meal complete with cloth, cutlery, and so on, with the flaps folded under the table. This permits easier access to a passenger occupying a seat near the window, and when he is seated the flap can be brought into position level with the table surface.

The traditional Pullman seating consists of movable arm-chairs, in the first and fixed seats in the second class.

Both types of seat have been modified in contour, springing, and upholstery in accordance with schemes of interior decoration.

The schemes for interior decoration are a complete departure from the traditional Pullman style which incorporates wood veneers with marquetry inlay. To devise a style which should combine contemporary trends with dignity, the Pullman Car Co. Ltd. engaged the services of Mr. John Carter, M.S.I.A., and he has been largely responsible for the styling and colour of the interiors.

Two of the four different schemes are for the first class and two for the second class cars. They are as follows:—

Scheme 1 (first class):

Ceilings are in french grey using either Lanide or Waverite Finaweave with a black line. Luggage racks are finished to match. Partitions are in polished Rio rosewood. Table tops are covered



Interior of first class Pullman car, showing lighting, glazed partition, and scheme of decoration

in black Lanide. Chairs are upholstered in special orange and black moquette and the patterned Wilton carpet consists of a serrated line of black, charcoal and light grey. Curtains are of Folk-weave with bright colours to tone.

Scheme 2 (first class):

Ceilings are covered with light tan Lanide or special Waverite buff with a fine black line. Racks and curtain pelmets are covered in Lanide to tone with partitions, which are in polished Rio rosewood, and table tops in Lanide Sirocco 29. Chairs are upholstered with bronze green and black moquette and the patterned Wilton carpet consists of a serrated line of black, bronze green, and light grey. Curtains are of Folk-

weave boldly patterned to tone with this scheme.

Scheme 3 (second class parlour cars):

Ceilings are covered in special Waverite grey Finaweave with black lines. Racks are covered in Lanide French grey and the body walls in special Waverite grey. The partition end doors are in polished Siamese teak veneer and the table tops are of Waverite Terracotta. The main floor is covered in linoleum with a charcoal background. The gangway between the tables is furnished with Wilton carpet of serrated design and coloured to suit. Curtains are of Folk-weave in gay colours.

Scheme 4 (second class kitchen cars):

The ceilings and body walls are covered in Waverite dove-grey. Racks are covered in Lanide French grey. Partitions and partition doors are in polished English walnut. Table tops are covered in Waverite fresco blue. Upholstery is in blue or green ribbed moquette, and the aisle carpet is specially woven to suit.

All metal fittings are finished to anodised aluminium matt, except in toilets and kitchens where the finish is of polished chrome plate.

Glazed Partitions

To add to the impression of spaciousness, the partitions, which in accordance with Pullman practice divide the main saloons into two portions.

In kitchens and pantries the body walls and shelving are lined throughout in light grey Formica. Kitchen sinks and sterilisers are in stainless steel. The stoves have been developed by Radiation, Limited in conjunction with the Pullman Car Co. Ltd. The fuel is propane gas.

Sliding door gear was supplied by Beckett, Laycock & Watkinson Limited.

The cars are wired for loudspeakers for a public address system in case it is decided to install such equipment.



Arrangement of seating and luggage racks, and décor in second class car

RAILWAY NEWS SECTION

PERSONAL

The appointment of Dr. Okechukwu Ikejaini as Chairman of the Nigerian Railway Corporation, reported in our June 24 issue, has now been confirmed.

Mr. T. R. Vachha, Engineer-in-Chief, Brahmaputra Bridge Project, India, who, as recorded in our September 2 issue, has been appointed Chief Engineer, North-East Frontier Railway of India, is a Civil Engineering

appointed Engineer-in-Chief, Brahmaputra Bridge Project, the position which he now vacates.

Mr. E. W. Isaacs, Additional Member (Mechanical), Indian Railway Board, has been appointed a Member (Engineering) of the Board.

The following have been appointed to the first autonomous Board of Directors of Buenos Aires Transport: President, Captain

1940. He was an Assistant Executive Engineer on the former East Indian Railway until 1941, when he was appointed Executive Engineer, Surveys & Construction. He subsequently became Executive Engineer, Projects & Design, Construction Department, E.I.R. In 1948 he was appointed Senior Superintendent, Way & Works. During 1947-48, he was visiting Lecturer in railway engineering at the Bengal Engineering College. He was responsible for all engineering arrangements for the Kumbh Fair at Hardwar in



Mr. T. R. Vachha
Appointed Chief Engineer, North-East Frontier Railway of India



Mr. M. Srinivasan
Appointed Engineer-in-Chief, Northern Railway of India

graduate of the University of Bombay, and a gold medallist. In 1938 he was appointed an Assistant Executive Engineer with the Indian Government Railways and served with the Eastern Bengal Railway. He was promoted to be an Executive Engineer on the Bengal Assam Railway in 1943, and also served in the Defence of India Railway Units, and worked in co-operation with the Railway units of the U.S. Army in India during the 1934-45 war. From 1946-53 he was a District Engineer on the Western Railway. In 1953 he was sent by the Government of India to Europe to study new techniques. In the same year he was delegated by the Government of India to the Railway Conference of the Economic Commission for Asia & the Far East held in Paris. In 1954 he became Bridge Engineer and later Deputy Chief Engineer, Western Railway. Five years later he visited the United States of America to study the design and construction of steel and concrete buildings and structures, steel fabricating shops and steel bridges. On his return he was

Horacio A. Estevearena; Vice-President, Eng. Aldo C. Branzini; Eng. Rodolfo; Members, A. Genovese, Eng. Roberto J. Monteverde, and Sr. Roberto Mariñelarena.

We regret to record the death of Mr. R. S. Wood, District Estate Surveyor, Derby, British Railways, London Midland Region.

Mr. R. H. Weir has been appointed Director, National Gas Turbine Establishment.

Mr. S. N. Jones, Assistant to the District Passenger Superintendent (Indoor) Newcastle, British Railways, North Eastern Region, has been appointed Assistant to the District Goods Superintendent (Sales) Newcastle.

Mr. M. Srinivasan, Joint Secretary in the Ministry of Railways (Railway Board), India, who, as recorded in our July 22 issue, has been appointed Engineer-in-Chief, Northern Railway of India, graduated from Bangalore Engineering College and joined the Indian Railway Engineering Service in

1950 and subsequently in 1954 for a similar fair at Allahabad. During 1948-54 he executed protection works at the Ganges bridges at Gurmukteshwar and Rajghat Narora and was responsible for the planning, design and execution of various major yard remodelling and construction works. He has also served as an examiner for Calcutta and Patna Universities. In 1954, he was posted as Civil Engineer with the Indian High Commission, London. In this capacity he established contacts with European railways, steel manufacturers, and others concerned with railway matters, which assisted him in his investigation of railway problems and new developments. He worked on the Indian Fact Finding Mission on Steel in 1956, and assisted the Indian Railways Steel Purchasing Mission in 1957. Mr. Srinivasan was a delegate from Indian Railways to the International Railway Congress Association Conference at Scheveningen in June, 1956. He was then posted to the India Supply Mission at Washington to supervise the supply of steel and iron from the U.S.A. and

Canada for the Second Five-Year Plan of Indian Railways. In June, 1958, he was appointed Joint Secretary in the Ministry of Railways (Railway Board), the position he has now relinquished to take up his present appointment.

Mr. L. Sproat, Operating Officer, British Railways, North Eastern Region, who, as recorded in our August 5 issue, has retired, joined the former North Eastern Railway Company as a clerk in 1912. During the 1914-18 war he served with the Durham Light Infantry. Soon after demobilisation, he took up an appointment in the Chief

The following appointments have been announced by the British Transport Commission:—Mr. A. J. Rogan, Surveyor, Lloyd's Register of Shipping, London, to be Assistant Shipbuilding Officer, Shipping & International Services Department; Mr. H. H. Ogilvy, Electrical Engineer, Admiralty Engineering Laboratory, to be Principal Scientific Officer, British Railways Central Staff, Electrical Engineering Department, Electric Traction Research Section.

Mr. J. H. Goss, Vice-President & Group Executive, of the General Electric Co. Ltd., and Mr. James A. Richardson, Vice-Presi-

ence at a number of stations, he was transferred to the Goods Manager's Rates Office at York. From the Rates Office, he was transferred to the Statistics Office, and later held positions in the Operating Superintendent's headquarters at York and the District Superintendent's Office at Darlington. In 1939 he returned to York as District Traffic Inspector, and subsequently became District Signalmen's Inspector, Deputy Chief Controller and Head of the Operating Superintendent's Special Inquiry Section. In 1945 he was appointed Head of the Freight Trains Section (Eastern-Operating and Motive Power) at Liverpool Street, London, and



Mr. L. Sproat
Operating Officer, North Eastern Region,
who has retired



Mr. F. L. Hick
Appointed Operating Officer, North Eastern
Region

Goods Manager's Office, North Eastern Railway Company, York, and was appointed a Traffic Apprentice in 1921. After training in the Traffic Department, he held posts as Assistant Yard Master, Dunston; Operating Assistant to Dock Superintendent, Alexandra Dock, Hull; and Assistant to District Superintendent, York. In 1928, Mr. Sproat became Assistant District Superintendent at Newcastle, and in 1933 was appointed Assistant to Superintendent (Trains), North Eastern Area, York. From 1936 to 1943 he was District Superintendent, York, and from 1943 to 1953, was District Operating Superintendent, Newcastle. In March, 1953, he was appointed Assistant Divisional Operating Superintendent (North Eastern Region), and in 1955 he became Assistant Operating Superintendent, North Eastern Region. In 1957, he was promoted to be Operating Officer, North Eastern Region. Mr. Sproat, was awarded the M.B.E. in the Birthday Honours List in 1959. For the past three years he has been Chairman of the North Eastern Federation of Railway Lecture & Debating Societies.

dent of James Richardson & Sons Ltd. have been elected, Directors of the International Nickel Co. of Canada Ltd.

TRANSPORT USERS' CONSULTATIVE COMMITTEES APPOINTMENTS

The following appointments to the Transport Users' Consultative Committees for the South Western and South Eastern Areas have been announced by the Ministry of Transport:—

South Western Area

Mr. D. S. Hart, a nominee of the British Transport Commission, to be a Member.

South Eastern Area

County Councillor Mrs. D. Elvy to be a Member, representing local authorities; Mrs. D. Young to be an Additional Member.

Mr. F. L. Hick, Assistant Operating Officer, British Railways, North Eastern Region, York, who, as recorded in our August 12 issue, has been appointed Operating Officer, North Eastern Region, York, joined the North Eastern Railway Company at Brafferton Station in 1922. Five years later, after experi-

later became Head of the Passenger Trains Section there. He returned to York in 1947 to become Head of the Passenger Trains Section (Operating & Commercial). In 1951 he was appointed Head of Traffic Section in the office of the Chief Regional Officer. In 1952 he was appointed Assistant to the Chief Regional Officer (General), a position which was later re-designated Assistant to General Manager (General). This appointment included the duties of Civil Defence Officer for railways in the North Eastern Region. Mr. Hick took a leading part in the development of Diesel Multiple Unit Services and was Chairman of the North Eastern Region Diesel Development Committee. He was largely responsible for the modern Diesel Multiple Unit Services developed in the North East. He is a Member of the Institute of Transport, and in 1956 was awarded the British Transport Commission's Institute of Transport Award for a paper on Diesel Rail Car Operation. He was recently an examiner on the subject of "Railway Transport Operation" for the Institute of Transport, and is a Trustee of the Railway Convalescent Homes.

NEW EQUIPMENT AND PROCESSES



Impact Wrenches

TORQUE-CONTROLLED reversible impact wrenches, the CP.610-RLTP with spline drive and the CP.610-RTP with 1-in. square drive, operate as conventional wrenches until the pre-set torque value is reached when the air supply to the motor is cut off automatically and the wrench ceases to impact.

Close control of final bolt-tightness is obtained by means of a torque-adjustment screw located in the handle of the wrench to set the required loading. There is also a lock-out button which, when pressed, allows the wrench to develop its full capacity.

The spline-drive shanks and sockets allow for maximum safety through positive retention of the socket. The retainer is integral with the shank and is automatic in operation; a quick release button in the shank frees the socket for removal. The greater efficiency claimed for the spline connection, as compared with square drive, reduces power-transfer losses and results in more even stress loading of the socket which therefore can be considerably lighter than the equivalent square-drive socket.

The weight of each model is 23 lb.; the overall length is 16½ in. The hose size for use with the tool is ½ in., and the inlet pipe thread size is ½ in. The maximum bolt size, when using the lock-out is 1½ in. The minimum torque is 300 lb.-ft.; the maximum is 600 lb.-ft. When bolting resilient materials the minimum figure can be appreciably lowered, and when bolting rigid materials the maximum can be raised.

Further details may be obtained from the Consolidated Pneumatic Tool Co. Ltd., 232, Dawes Road, London, S.W.6.

Glass-Fibre Laminated Panels

ARCHITECTURAL panels of self-coloured laminated glass-fibre and polyester resin, available in four alternative patterns, are claimed to be considerably lighter than other decorative materials of equivalent strength. The resistance offered to corrosion should be of particular value in helping to reduce maintenance costs on railway buildings situated in chemical-laden atmospheres and near the coast.

The decorative finish may be either embossed or recessed. Reeded panels are available with the surface section convex or concave and spaced at ½-in. centres. Colour and fire-resistance meet the requirements of the appropriate British Standard specification. For large orders, any colour and any thickness complying with strength requirements can be supplied. The panels are fixed by any conventional method and can be bonded to flexible asbestos sheets or hard-

board. They are termite- and fungus-proof.

Standard sizes are 4 ft. square and 8 ft. x 4 ft. Double-sided laminate ⅝-in. thick is priced at about 7s. 6d. a sq. ft. according to specification and quantity; single sided, ⅝-in. thick, costs about 3s. 9d.

Further details may be obtained from Glass Fibre Developments Limited, 81, South Coast Road, Peacehaven, Sussex.

Time Indicators

SELACHRON elapsed-time indicators, for wiring directly to the terminals of electrical equipment, weigh less than 2 oz. and have no moving parts. Versions are available suitable for recording the total time of operation with either a.c. or d.c. supply and in sizes for use with voltages from six to 300, thus obviating the need for any extra relays or switches.

They consist of cartridges which contain small replaceable electro-chemical cells, embodying an anode, cathode, and electrolyte. The anode is consumed as current passes through the cell, the length diminishing in proportion to the accumulated hours of operation. A calibrated scale alongside the anode enables visual readings to be taken. The length of each indicator is 2½ in., the diameter 1 in.

Further details may be obtained from Industrial Instruments Limited, 9, Paved Court, Richmond, Surrey.

Lightweight Monorail Conveyor

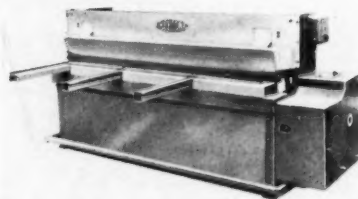
CHAINVEYOR overhead monorail conveyors for use inside factories and stores are of lightweight construction yet they can carry any unit load which can be handled on and off the conveyor by manual effort, i.e., up to about 120 lb.

They are applicable to most industries and duties and can be arranged to run horizontally, upwards, downwards, vertically, and, in suitable cases, even inverted. Standardisation and simplicity of component parts and the elimination of units involving rapid wear and complicated maintenance should lead to substantial savings

both on initial cost and on general upkeep.

Virtually total enclosure of all working parts of the main conveying unit gives advantages over most other systems intended for similar duties. Light weight enables customers to carry out installation work without difficulty.

Further details may be obtained from the sole concessionaires for manufacture and distribution in the United Kingdom and most Commonwealth territories, T. & T. Works Limited, Billesdon, Leicester.

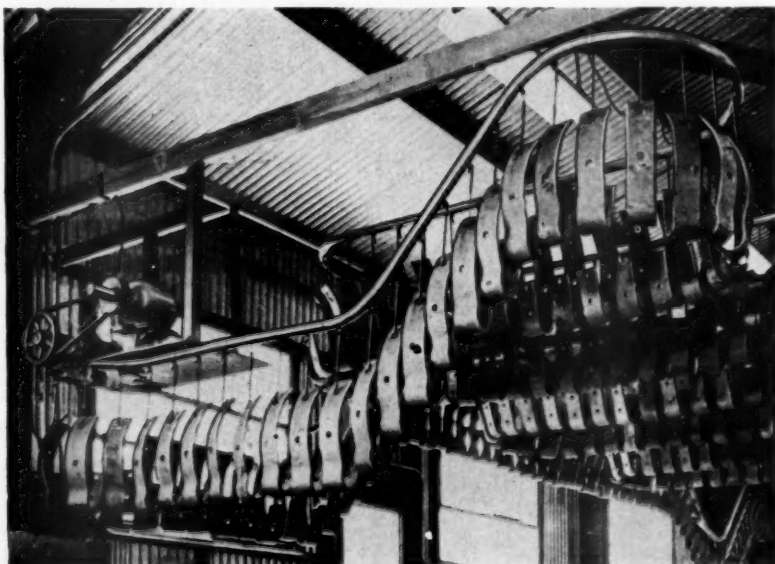


High-speed Shears

KEETONA high-speed shears for accurately shearing ¼-in. and 14-s.w.g. metal sheet are of simple design with ready accessibility for blade changing. Construction is rigid to minimise deflection and ensure cutting accuracy.

The capacity range is 78 in. x ½ in., 50 in. x ½ in., 78 in. x 14 s.w.g., and 50 in. by 14 s.w.g. Standard equipment includes four cutting-edge blades for mild steel; special quality and high-grade quality blades are available as extra equipment for cutting silicon steels and stainless steel. Front gauge and back gauge are adjustable up to 30 in. and 24 in. respectively on all models. The ¼-in. machines operate at 76 strokes per min.; the 14-s.w.g. machines at 65 strokes per min.

Steel fabricated box-type construction is used. The cutting beam has slideways lined with non-metallic plastic material to prevent scoring and minimise friction. An automatic hold-down arrangement is incor-



porated. The hold-down beam has moulded pads to give a good grip on the material during cutting. On the return stroke, springs act as counterbalances for the cutting beam and ensure smooth operation of the shear.

A full-length treadle operates the clutch which engages the driving shaft with the main driving wheel. To ensure instantaneous engagement the clutch, which has nine hardened jaws, is spring loaded into position on depressing the treadle.

Two large eccentrics on the drive shaft operate the cutting beam through connecting links fitted with Alzen bronze bushes. The drive from the electric motor is through V-ropes to a high-speed flywheel which forms the main-drive wheel on the 14-s.w.g. machines, or drives through gearing on the $\frac{1}{2}$ -in. machines. The mechanism is readily accessible through hinged or removable guards.

Further details may be obtained from Keeton, Sons & Co. Ltd., Greenland Road, Sheffield, 9.

Toolroom Lathe

THE 75H.S. 7 $\frac{1}{2}$ -in. toolroom lathe has been designed for ease of operation and prolonged service with a high degree of accuracy. It will admit 45 in. between centres, swing 15 in. over the bed, or 17 $\frac{1}{2}$ x 8 in. in gap, and 8 $\frac{1}{2}$ in. over cross-slide. It retains the rigidity of a straight-bed machine.

There are 21 spindle speeds, 30–380 r.p.m. geared, and 240–3,000 r.p.m. with a toothed-belt drive. A combination of electromagnetic multi-disc clutches and constant-mesh gears enable speeds to be pre-selected by rotary switch and changed by push-button without stopping the machine. Control buttons for stopping, braking, and inching are duplicated on the carriage apron. The inching motion produces a low speed regardless of the pre-selected running speed. A single knob gives direct conversion to metric pitches and feeds.

A special high-speed adaptor supports two Timken oil-jet-lubricated precision spindle bearings independently of the main headstock casing; this has air cooling by built-in independently-driven fan. A third bearing at the rear of the spindle is of the parallel-roller type. All gears are of chrome-molybdenum steel, precision shaved, flame-hardened, and liquid honed.

Further details may be obtained from Woodhouse & Mitchell, Wakefield Road, Brighouse, Yorks.



Abrasive-Belt Grinder

MORRISFLEX MA.706 abrasive-band machines for all kinds of hand-held grinding work incorporate a dust-extractor unit in the pedestal.

The basic machine is the M.160, a design which has been in use for some years in widely assorted industries. It consists of a 1-h.p. three-phase, totally enclosed fan-cooled motor (or $\frac{1}{2}$ -h.p. single phase) driving a 5-ft. abrasive belt, 1 in. or 2 in. wide, over a jockey pulley and a contact wheel. The belt speed is constant at 6,000 surface ft. per min. A set of four rubber contact wheels, ranging from 1 $\frac{1}{2}$ in. dia. x 1 in. wide to 4 in. dia. x 2 in. wide, is provided; also a Shearflex wheel 4 in. dia. x 2 in. wide is available for arduous work. A three-in-one attachment can be supplied; this consists of a spindle for carrying a grinding wheel or wire brush on the left of the contact wheel, and a collet for mounted points or rotary burrs on the right-hand side.

Each machine is mounted on an M.475 dust extractor, complete with hoods and trunking. This has a $\frac{1}{2}$ -h.p. motor and a

capacity of 475 cu. ft. per min. The price is £156 for the complete machine; the M.160 (without dust extractor) continues to be available, at £83 10s.

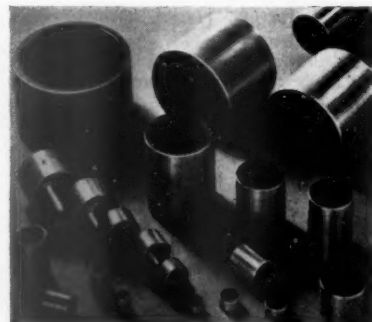
Further details may be obtained from B. O. Morris Limited, Morrisflex Works, Briton Road, Coventry.

Dry Bearings

POLYSLIP dry bearings, introduced in 1958 for use with machinery handling oil-solvents or in dust-laden atmospheres, have been subjected to further research and development which has made possible the production of an improved standard material designated Polyslip 1M. This is a special porous bronze matrix produced by the powder-metallurgy technique with pores at the working surfaces impregnated with a mixture of P.T.F.E. (polytetrafluoroethylene or Fluon or Teflon) and lead additive.

The 90:10 bronze matrix provides rigid strength, the lead ensures low wear rate, and the P.T.F.E. ensures low surface friction even under extreme temperature conditions. The new material has four to five times the merits of the earlier Polyslip materials; through standardisation of sizes it is also less expensive and it is claimed to meet the majority of requirements stipulated by manufacturers. Cost is still higher than for equivalent oil-retaining bearings.

Standard sizes for Polyslip 1M cylindrical bearings are based on British Standard 1131, Part 5, 1955, to provide internal diameters in 14 logical steps from $\frac{1}{16}$ in. to 2 $\frac{1}{2}$ in. For



each bore there will be, in general, two alternative lengths available. Out-of-standard shapes can be produced by machining the external surfaces but on no account must the working surfaces be machined. Non-standard cylindrical bearings, flanged bearings, and thrust washers can be supplied when quantities are sufficient to justify tooling.

Performance, in terms of load, speed, and life, is considerably increased compared with the original Polyslip dry bearings. For example a PV factor (pressure x velocity product) of 6,500 lb. per sq. in. x ft. per min. will give a life of 1,000 hr. under completely dry conditions when operating with mild-steel shafts at the recommended clearances. Using hardened shafts, the life is increased especially at the lower PV range. Operation in a liquid of any kind, provided it does not react chemically with the metals used, gives a considerable increase in performance under all conditions. The maximum allowable pressure is 4,000 lb. per sq. in., which is governed by the strength of the bronze matrix. The upper temperature limit is about 280°C. and P.T.F.E. has been used successfully at -200°C.

Further details may be obtained from Bound Brook Bearings Limited, Trent Valley Trading Estate, Lichfield, Staffs.



Australian and New Zealand Commissioners Conference

Discussions in Perth on the provision of improved services

Following on the Australian and New Zealand Railways Officers' Conference held in Perth, Western Australia, during the week ended June 4, 1960, the Commissioners of all the various Australian railway systems and the General Manager of the New Zealand Railways met in Perth during the week, September 12 to 17. It is the first time the Conference has met in Perth since 1947 and only the second time since the inception of inter-system conferences in 1897.

The predominant note in the discussions was the desire to provide improved railway services to the public and to ensure that nothing be left undone which would hamper the provision of the most suitable and economical rail transportation for individual needs, for industrial and agricultural expansion, and for national development. The Commissioners are expressly concerned with the necessity for attracting additional business to the railways and very serious consideration was given to the development and extension of the commercial side of railway activities with this object in view.

Inspection of Electronic Accounting

During the stay in Perth the Commissioners took the opportunity to inspect some of Western Australia's railway features, including the electronic accounting installation and the centralised traffic control system. The Commissioners were impressed with the extent and capacity of the accounting equipment used in this State and the wide scope of statistical and pay-sheet work which is being performed. Most other systems are planning to change over from manual to electronic accounting, but all the visitors agreed that Western Australia was well in advance in this field. The centralised traffic control installation located at Perth was examined with interest.

The Commissioners were able to discuss the concept of modern passenger accommodation for long distance and particularly inter-state passenger movement and, as a consequence, it was confirmed that the two new "Westland" trains for Trans-Australian traffic on the Perth-Kalgoorlie section of the W.A.G.R. will embrace the good points of the best trains which have been built or are being built elsewhere.

The conference agenda was a lengthy one, including items of importance in respect of mechanical and civil engineering, accounting,

traffic, and signalling subjects and covered such matters as:—

Alterations or modifications to structure and wagon dimensions to facilitate handling of traffic by mechanical appliances, such as fork-lift trucks.

Extension of the use and increase in the dimensions of containers for the handling of goods, with particular reference to the acceptance of goods in palletised form and for the packaged handling of mails and parcels.

Extension of the period for booking of seats and sleeping berths for inter-state travel from six to 12 months in advance.

Planning of future technical requirements for anticipated heavier traffic which it is certain will have to be catered for.

The means by which improved schedules may be arranged for the conveyance of goods between Perth and the Eastern States.

The conference devoted attention to the determination of standards for clearance of structures, strength of bridges and other features which will allow of standard gauge expansion in due course. The accompanying illustration of the Commissioners in conference shows, left to right, Messrs. G. V. Moriarty, Commissioner for Railways, Queensland; C. E. Baird, Commissioner for Transport, Tasmania; A. T. Gandell, General Manager, New Zealand Railways; E. H. Brownbill, Chairman of Commissioners, Victorian Railways; K. A. Smith, Acting Railways Commissioner, Commonwealth Railways; C. G. C. Wayne, Commissioner of Railways, Western Australia; N. McCusker, Commissioner for Railways, New South Wales; J. A. Fargher, Commissioner, South Australian Railways.

New Station at Port Talbot

Re-construction of Port Talbot Station, on the South Wales main line of the Western Region, British Railways, is expected to be complete by the beginning of 1963. The work involves replacement of the existing station, which consists of up and down platforms served by the two running lines. The re-building scheme provides for two new main lines, two relief lines, and two Rhondda and

Swansea Bay branch tracks; an island platform; and a new signalbox controlling some 12 miles of track.

The buildings on the old up platform, and the platform itself, have been demolished to make room for the future up main and relief lines. The stationmaster's office and a general waiting room will be built on the new island platform between the main lines. A footbridge will connect this with the new block of buildings to be built over the site of the original forecourt.

Temporary Buildings

Temporary prefabricated buildings have been erected on a new platform already constructed. This will be served by two lines of the Rhondda & Swansea Bay branch, giving a new direct connection to Aberavon and Aberavon Seaside. All east-bound trains will use this platform until the new up main line and the island platform can be brought into use. To accommodate main-line trains of 10-12 vehicles, until the island platform is ready for use, the Rhondda & Swansea Bay branch platform has been extended as a temporary measure.

At the Cardiff end of the station, a steel footbridge has replaced the former structure. Lifting barriers, at present controlled by a temporary signalbox opposite the old one, have replaced the level-crossing gates. Ultimately the barriers themselves, and all the junctions and multiple-aspect signals over a distance of several miles, will be controlled by the new box built on the site of the original one, to the seaward side of the lines.

Reversible Working

Reversible working will enable trains to be transferred between the up and down main lines to give greater variation in routing when the station platform lines are occupied.

The first stage of the permanent way work, which included taking up sidings near, and building a new line into the new R. & S.B. platform, was completed in April. The final stages should be finished by the end of this year. Early next year work on the actual station buildings on the new island platform will begin and by midsummer work on the foundations of the station block outside (over the old forecourt) will start.

Irish Winter Train Services

With the introduction of the winter timetable, certain important alterations have been made in Irish passenger train services. The 5.30 p.m. diesel "Enterprise" express from Dublin (Amiens Street) to Belfast, hitherto non-stop, now calls at Dundalk 6.28-6.29 p.m., but without alteration of its Belfast 7.40 p.m. arrival. It is possible to restrict the stop at this frontier station to 1 min. as passengers are picked up only, and thus passed through the Eire customs before joining the train.

As to other alterations on this main line, the 9.15 a.m. from Dublin to Belfast arrives 5 min. earlier, at 12.15 p.m.; the 2.45 p.m. stops additionally at Lisburn; the 6.30 p.m. also stops at Lisburn, but omits its Gormanston call, and is due in Belfast 10 min. later, at 9.45 p.m. Coming south, the 8.15 a.m. from Belfast to Dublin is accelerated 10 min., to arrive at 11.5 a.m.; the 11.40 a.m. is withdrawn; the 3 p.m. starts at 2.15 p.m., ceases to stop at Balbriggan and Skerries, and reaches Dublin at 5.5 p.m., an acceleration of 20 min.; and the 6 p.m. from Belfast is into Dublin 10 min. earlier, at 9.5 p.m.

On the Ulster Transport Authority lines the former 11 a.m. from Belfast to Londonderry now starts 10 min. later, calls additionally at Antrim, and reaches Londonderry



Australian and New Zealand Railways Commissioners in Conference

13 min. later, at 1.13 p.m. Except on Saturdays, the 2.50 p.m. from Belfast to Londonderry runs no further than Ballymena. The 11.10 a.m. from Londonderry to Belfast starts at 11.20 a.m. and runs 10 min. later, while the 1.5 p.m. starts at 12.55 p.m., and is into Belfast at 3.40 instead of 3.47 p.m. The 5.45 p.m. from Londonderry is now starting 5 min. earlier to stop additionally at Culmore.

During the winter passenger service is being withdrawn from the Portrush branch, and trains which previously ran to and from Portrush now terminate at and start from Coleraine, except the 7.55 a.m. from Portrush to Belfast, which starts instead from Londonderry at 7.25 a.m. On the Belfast-Larne line several starting times have been altered by 5 min.; also the 7 p.m. from Belfast is extended from Carrickfergus to Larne, and the 6.5 p.m. from Kilroot to Belfast now starts from Larne at 5.43 p.m.

On the Coras Iompair Eireann lines there are very few changes, but one of importance is a new express on Sundays from Dublin Kingsbridge, at 10 a.m. to Cork, calling only at Limerick Junction and Mallow and arriving at 1.30 p.m. A complementary service is provided in the reverse direction from Cork at 9 a.m. to Dublin, calling at principal stations and reaching Kingsbridge at 12.35 p.m. The former 6 p.m. from Cork to Dublin on Sundays is now starting at 6.30 p.m., and arriving at 10.5 instead of 9.20 p.m.

L. T. & S. Line Electric Services

Electrification of the London, Tilbury & Southend Line of British Railways, Eastern Region, is due for completion during 1961.

The following plans for passenger services are announced:—

The morning and evening peak services Mondays to Fridays will be substantially increased. During the morning peak there will be 40 train arrivals at Fenchurch Street against 32 at present and in the evening 38 departures against 29 at present. With the variation in the intensity of the peak these services are built up to a maximum of 18 arrivals at Fenchurch Street between 8 a.m. and 9 a.m. compared with 12 at present, and 21 departures between 5 p.m. and 6 p.m. compared with 12 at present.

Increased Seating Capacity

With 12-car trains providing seats for nearly 1,100 passengers, including first-class accommodation on all trains, there will be over 50 per cent increase in seating capacity in trains leaving Fenchurch Street during the peak period.

During the peak hours the journey between London and Benfleet will be performed in 35 min., London-Leigh in 40 min., and London-Stanford-le-Hope in 42 min.

On the Upminster-Grays branch there will be a twice hourly service between Upminster and Ockendon, with alternate trains extended to Grays. During the peak period basically a 20-min. service will operate. Between Romford and Upminster three-car diesel units will continue to operate a half-hourly interval service.

Present Service Doubled

The off-peak pattern will provide four trains an hr. in each direction between Fenchurch Street and Shoeburyness, with two trains per hour via Tilbury also running to and from Shoeburyness, i.e. double the present standard service.

Included in the four direct Shoeburyness trains will be two fast trains in each direction

serving the Borough of Southend, calling alternately at Upminster/Benfleet; and Barking; that is to say, the principle of alternating calls at Barking and Upminster on the fast services will be continued, but Benfleet will be included in one of the fasts. The stopping trains will cater for the other stations. All the train services off peak will be on a regular interval basis.

Frequent Service in Southend

All these trains will call at all stations in the Borough of Southend, giving a 10-12 min. service in each direction, which it is hoped will encourage travel between the seven stations within the Borough.

The half-hourly fasts will perform the journey between Leigh and London (32 miles) in 37 min., with one stop, and 39 min. with two calls including Benfleet, averaging 52 m.p.h. These trains will take 45 and 47 min. respectively between Southend Central and London, compared with a normal 60 min. with steam.

Fast Timings

The two fast trains an hr. off peak will cover the journey between Thorpe Bay and Fenchurch Street in just over 50 min., against 70 on present standard timings. The fastest train in the day will be the 9 a.m. from Thorpe Bay, which will run from Southend Central-London in 43 min. and from Leigh to London in 35 min. This pattern is the equivalent of a 40-min. journey between London and Southend.

Stations Bromley to East Ham, and Upney to Upminster Bridge inclusive will be served by London Transport trains.

Anglo-Swiss Winter Train Service

With the introduction of the Continental winter timetable on October 2, there will be a considerable acceleration of the afternoon service from London to Switzerland. Departure from Victoria is 2 hr. later than last winter, at 2.30 instead of 12.30 p.m.; the wait at Folkestone Harbour is cut from 52 to 27 min., and at Calais Maritime from 62 to 45 min. Train CB will leave Calais at 8 p.m. instead of 6.42 p.m. (European time), and 24 min. acceleration brings it into Basle by 6.9 instead of 5.15 a.m. There it connects with the 6.51 a.m. from Basle to Berne and Interlaken, arriving at the latter at 9.44 instead of 9.5 a.m., a total gain of nearly 1½ hr. from London. Through sleeping car and *couchette* accommodation from Calais to Interlaken will not come into operation until December 16.

Connection to Chur is now by the 7 a.m. from Basle, instead of the 6 a.m. "Arlberg-Orient" express as formerly, reaching Chur at 10.19 instead of 9.12 a.m. From December 16 there will be a through sleeping car and *couchettes* from Calais to Chur, and from the same date connecting trains will arrive at Davos at 11.42 a.m. and St. Moritz at 12.58 p.m., as compared with 10.33 a.m. and 12.4 p.m. last winter. There is no alteration of the return BC working from Basle to Calais and Victoria.

New "Alpenrose" Service

Daily from December 16 to January 15, and on Thursdays, Fridays and Saturdays thereafter, the new "Alpenrose" express will depart from Calais at 3.25 p.m. in connection with the 9.30 a.m. service from Victoria. This will be due in Basle at 1.50 a.m., and will convey a sleeping car and *couchettes* for Chur and through coaches for Schwarzhach St. Veit, Austria, by the Arlberg route. Leaving Basle at 2.36 a.m., the train will have no

advertised stop until Sargans. From here the Austrian portion will leave immediately but the Chur portion will be held for 2 hr., so as not to reach Chur at too untimely an hour; arrival there will be at 7.48 a.m., and by connections at Arosa at 9 a.m., Davos (via Landquart) at 9.10 a.m., and St. Moritz at 10.43 a.m. The Arlberg section will be into Innsbruck by 9.16 a.m. and Schwarzhach St. Veit by 12.25 p.m.

The reverse working also will provide a substantially faster journey than the previous BC service from Basle. Departures from St. Moritz, Davos, and Chur will be at 7.12, 8.33 and 9.59 p.m. instead of 6.9, 7.25 and 8.51 p.m. respectively; from Basle the "Alpenrose" will start 70 min. later, at 1.45 a.m.; and Calais will be reached in time to connect with the midday boat, giving an unaltered Victoria arrival at 3.5 p.m. The same sleeping facilities will be provided as in the eastbound direction.

Staff and Labour Matters

Railway Shopmen's Wages

An unofficial 24-hr. token strike was staged at a number of motive power depots on British Railways on September 27 by maintenance workshop staff because of resentment over the offer by the British Transport Commission of a further increase of 3 per cent in settlement of the wage demand put forward by the National Union of Railwaymen and the Confederation of Shipbuilding & Engineering Unions. The men consider the amount of increase offered is inadequate in relation to the increases received by other railway staff under the Guillebaud Report, which did not cover railway shopmen. There was no serious interference with traffic as a result of the work stoppage.

A special sub-committee of the Railway Shopmen's National Council met on September 26 and 27 to explore ways of overcoming the difficulties. Subsequently the employees' side of the Council met the Chairman, Sir Brian Robertson, and other representatives of the Commission, late on September 28. At the time of going to press, the outcome of this meeting was not known.

Incentive Bonus Scheme for L.T.E. Busmen

The incentive bonus scheme for London Transport Executive drivers and conductors was rejected earlier this week by the garages concerned. The Negotiating Committee of the Transport & General Workers' Union then discussed the next step with Mr. Frank Cousins, Secretary of the T.G.W.U.

RAILWAY QUEEN'S VISIT TO SHREWSBURY.—Miss Sheila Riordan, of London, fulfilled her first engagement as Britain's Railway Queen on September 23 and 24, on a visit to Shrewsbury at the request of the Railwaymen's Condoover Hall Adoption Society, which provides out-of-school activities for the blind and crippled children at Condoover Hall. She was met at Shrewsbury, on September 23 by the Stationmaster, Mr. H. Hanley, and was introduced to officers and staff of Shrewsbury District, Western Region, and to representatives of railway trades unions. After luncheon, Miss Riordan visited Condoover Hall. In the evening she attended, in full regalia, a ball in aid of the Condoover Hall Adoption Society, when she was welcomed by the Mayor of Shrewsbury, Alderman Huckfield. Next day, she was presented at Shrewsbury Guildhall, with a brooch of the Shrewsbury coat-of-arms.

Contracts and Tenders

Diesel-electric locomotives for New South Wales Government Railways

A. E. Goodwin Limited, Sydney, has received a repeat order from the New South Wales Government Railways for 10 Goodwin-Alco 1,000-h.p. branch-line diesel-electric locomotives. The value of the order is £A800,000.

Plasser Railway Machinery (G.B.) Limited has received a contract from the London Midland Region of British Railways for three Plasser-Theurer hydraulic power track wrenches, Model "P.12," and 11 double-ended screwing chucks for use with fishplate bolts.

British Transport Commission (South Wales Docks), has placed the following:—

Andrew Scott (Civil Engineers) Limited: reconstruction of crane track and associated works, on No. 4 Quay at Swansea Docks

Associated Electrical Industries Limited: supply of switchgear for sub-station, No. 4 Quay, Swansea Docks

E. A. Bond & Co. Ltd.: construction of office and workshop, South Dock, Newport

Industrial Engineering Limited: re-sheeting of roof and repairs to walls, "F" Shed, Kings Dock, Swansea

D. T. Edwards & Co. Ltd.: re-sheeting sides and ends of "G" Shed, Prince of Wales Dock, Swansea

Stothert & Pitt Limited: supply of electric capstans, North Side, Queen Alexandra Dock, Cardiff

Penarth Pontoon Slipway & Ship-repairing Company: repairs to dredger Taff, South Wales Docks.

British Railways, London Midland Region, has placed the following contracts:—

J. B. Corrie (Flectella) Limited: 1960 fencing renewal programme for Manchester district

A. J. Binns Limited: 1960 fencing renewal programme for Northampton District

Morton Browne Limited: reconstruction of booking and inquiry offices at Chester General Station

Seddon (Stoke) Limited: erection of Progress Office at Crewe Locomotive Works

H. Camm & Co. Ltd.: earthworks and drainage at Grange Junction Sidings, Etruria, Stoke-on-Trent

The Border Engineering Contractors Limited: construction of oil separators at Upperby Motive Power Depot, Carlisle

John E. B. Wheatley Limited: repairs and repointing to brickwork at Gilbrook Viaduct, Awwsworth.

British Railways, Southern Region, has placed the following contracts:—

Macartney & Sons: repairs to roofs, Wimbledon Station

Fairey Air Surveys Limited: aerial survey, New Cross Gate-Deptford Wharf

Durable Asphalte Co. Ltd.: repairs to roofs, Kingston and Waterloo Stations

Harry Neal Limited: removal of bridge and reinstatement of highway, Greenwich Royal Hill

Truett & Steel Limited: construction of new station buildings, platform roofing and ancillary works, Hurst Green new station.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Victoria:

50 traction motor gear wheels
120 traction motor pinions.

The issuing authority is the Secretary, Victorian Railways, Spencer Street, Melbourne, to whom bids should be sent. The tender No. is 61,793. The closing date is October 5, 1960. The Board of Trade reference is ESB/25140/60.

From Pakistan:

10 double sets of batteries suitable for train lighting purpose, nickel iron alkaline type 240 Ah. capacity built in hard wood crates; each crate containing two cells and each set of battery containing 19 cells. The overall dimension of each crate shall not be bigger than 17 in. height by 13 in. length by 7 in. width. The batteries shall be supplied complete with dry electrolyte in 10-lb. container for the first filling. The batteries shall conform in all respects with the latest Pakistan standard specification (E2/49).

The issuing authority is the Chief Controller of Stores, E.B. Railway Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HB2/34/60. The closing date is November 3, 1960. The Board of Trade reference is ESB/25195/60.

590 axleboxes C.S. machined, with face plates 10 in. by 5 in. or 5½ in. by 7½ in. by 2½ in. groove (BG) to IRS drg. No. WA/570 and WA/581 Alt. 6 and part drgs. and PRSS No. R7 and M5.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P5/ACST/EBI/29/60. The closing date is October 25, 1960. The Board of Trade reference is ESB/25301/60.

From Egypt:

2,100 draw hook coil inner and outer springs.

The issuing authority is the Egyptian Republic Railways. Tenders should be addressed to the Purchase & Stores Department, Railways Building, fifth floor, over Shoubra Subway, Cairo. The tender No. is E.R.321 G.8/2/1434. The closing date is November 1, 1960. The Board of Trade reference is ESB/24107/60. No further information is available at the Board of Trade.

40,000 kgs. of ferro manganese
7,000 kgs. of ferro silicon.

The issuing authority is the Egyptian Republic Railways. Bids should be sent to the Purchase & Stores Department, Railways Building, fifth floor, over Shoubra Subway, Cairo. The tender No. is E.R.306 G.8/535. The closing date is October 29, 1960. The Board of Trade reference is ESB/24108/60. No further information concerning this call for tender is available at the Board of Trade.

From Sudan:

15 twin-bogie oil tank wagons, 2,000-gal. capacity

580 twin-bogie steel flat wagons, 9-ton capacity

6 twin-bogie water tank wagons, 2,000-ton capacity

28 twin-bogie guards wagons.

The issuing authority is the Assistant General Manager (Supplies). The Sudan Gezira Board, Barakat, to whom bids should be sent. The tender No. is SGB/SUP/10-A.

The closing date is October 22, 1960. The Board of Trade reference is ESB/25013/60.

3 twin-bogie steel and aluminium box wagons, 9-ton capacity

120 twin-bogie all-steel box wagons, 9-ton capacity.

The issuing authority is the Assistant General Manager (Supplies), the Sudan Gezira Board, Barakat, to whom bids should be sent. The tender No. is SGB/10-A. The closing date is October 22, 1960. The Board of Trade reference is ESB/25014/60.

From Australia:

21 sets of automatic shut-off refuelling equipments for 21 locomotives, 4 in. N.T.P.

14 sets of automatic shut-off refuelling equipments for 14 locomotives, 2½ in. N.T.P.

16 sets of automatic shut-off refuelling equipments for 16 stations.

The issuing authority is the Secretary, Commonwealth Railways, 623 Collins Street, Melbourne, C.I., to whom bids should be sent. The tender No. is ME. 1419. The closing date is October 11, 1960. The Board of Trade reference is ESB/25169/60.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lac House), Theobald's Road, W.C.1).

Notes and News

Order for Perkins' Diesel Engines.—An order worth nearly £150,000 for four-cylinder diesel engines for use in German-built fork-lift trucks has been placed with Perkins Engines Limited of Peterborough. The engines have been ordered by Ruhr Intrans Hubstapler G.M.B.H., of Mulheim, and will be fitted in the U.S.-designed Clarklift 2½- and 3½-ton fork-lift trucks manufactured by the German company.

Contracts for Underground Car Panels.—Contracts to the value of £30,000 for car panel spaces inside London Transport Underground trains have been arranged with British Transport Advertising. Among the advertisers who have ordered 20,000 panels are Calpreta, Guinness, Meggesons, Dr. Page Barker's Hair Tonic, and Kardomah Cafes. The advertisements will be on display after October 1 for periods ranging from three months to a year.

R.H.A. Annual Conference.—The Road Haulage Association annual conference will be held at Blackpool on October 11 and 12. Among resolutions to be debated is one against tolls for trunk roads. Sir Richard Nugent, M.P., a former Parliamentary Secretary to the Ministry of Transport, will be the principal guest at the banquet at the Winter Gardens on October 12.

Travolator Inaugurated at Bank Station.—The Travolator installation at Bank Station, connecting the Waterloo & City Line, British Railways, Southern Region, with the rebuilt booking hall, was officially opened by Sir Edmund Stockdale, the Lord Mayor of London, last Tuesday. At a brief reception at the Grocers Hall following the ceremony, Sir Philip Warter, Chairman of the Southern Area Board, British Transport Commission,

thanked the Lord Mayor for formally switching on the Travolator, and welcomed all the representatives of the various activities of the City of London. He paid tribute to the consulting engineers, Messrs. Mott Hay & Anderson, the contractors Mitchell Bros. Sons & Co. Ltd., and the Otis Elevator Company, for the way they had tackled all the problems and thanked them all on behalf of the Southern Area Board and the Southern Region.

German Federal Railway Bond Issue.—A loan of D.M.310 million (about £26 million) at 6½ per cent, for the German Federal Railway was over-subscribed on September 20 within a few hours of the lists opening. At a price of issue of 97 per cent, the bonds yield more than 7 per cent.

Luxembourg Freight Traffic.—An analysis of the freight and mineral train operation of the Luxembourg Railways (C.F.L.) throughout 1959 showed that bloc trains of iron ore coming into the country, and for which the C.F.L. had only a short haul, had an average gross weight of 1,800 tons; bloc trains of coal and coke, also generally short-haul, ranged from 1,400 to 1,550 tons in average; and main-line miscellaneous-freight trains 800 tons. Of the 1,500,000 freight-train km. (930,000 train-miles) in the year, steam traction handled 52 per cent, diesel locomotives 28 per cent, and electric locomotives 20 per cent.

Pan American Railway Congress.—The Pan American Railway Congress will be held in Rio de Janeiro on October 11-20, in Sao Paulo on October 21-25, and in Brasilia on October 26 and 27. The President of the Pan American Railway Congress Association is Senor Eduardo M. Huergo, former General Manager of the Argentine National Railways. The British delegation will be led by Brigadier C. A. Langley, Chief Inspecting Officer of Railways, Ministry of Transport. The other members will be: Mr. D. S. Purdom, Technical Consultant, English Electric Co. Ltd.; Mr. S. E. W. Stokes, Representative in South America of the Westinghouse Brake & Signal Co. Ltd.; and Mr. E. J. Wilson, General Manager (Contracts), Metropolitan-Cammell Carriage & Wagon Co. Ltd., representing the Railway Carriage & Wagon Building Association.

East African Railways Diesel Locomotives.—As reported in last week's issue, East African Railways has received two Class "90" diesel-electric locomotives at Nairobi for

testing before going into service on the Nairobi-Nakuru line. The locomotives were built by the English Electric Co. Ltd. The accompanying illustration shows Messrs. J. Hudson, Chief Mechanical Engineer; H. B. Marshall, Assistant Chief Mechanical Engineer (Motive Power); and G. P. G. Mackay, Acting General Manager, discussing the locomotive with Mr. J. R. P. McCrindle, Senior Mechanical Engineer (Motive Power), in the cab.

George Cohen Sons & Co. Ltd. Trade Mark.—The figures 600 have been registered as the trade mark of George Cohen Sons & Co. Ltd., and most of the firm's associates in the George Cohen 600 Group will be registered as users. The origin of the mark is the address, 600, Commercial Road, London, E.14, to which the company transferred in 1876.

Oldham & Son Ltd. Report.—Mr. J. Oldham, Chairman of Oldham & Son Ltd., reported to shareholders at Manchester that sales and production had both increased in the first five months of the year. He considered that, in the absence of unforeseen developments, the improved trend could be expected to continue throughout the present year.

Liners Names for Locomotives.—Two Mersey liners gave their names to two diesel-electric locomotives at Liverpool on September 20. The 2,000-h.p. locomotives, which will haul London boat trains had special name plaques fitted bearing the names ss. *Mauretania* after Cunard Steam-Ship Co. Ltd. 35,000-ton liner, and ms. *Aureol* after the Elder Dempster Lines Limited flagship. Sir John Brocklebank, chairman of Cunard, and Mr. M. Glasier, director of Elder Dempster, unveiled the plaques and then drove the locomotives up and down the platform of Riverside Station. British Railways has been given permission to name similar locomotives after other Liverpool ships.

Lecture Course on Railway Development in Britain.—A course of 26 illustrated lectures, followed by discussions, on railway development in Britain from 1802 to 1960 is to be held at the Evening Department of Adult Education, Goldsmiths' College, London. The tutor for the course, which begins on October 4 at 7 p.m. and will be held at the same time on subsequent Tuesdays, is Mr. R. H. G. Thomas. The syllabus is in four parts. Part I (two lectures) is introductory.

Part II (14 lectures) covers the history of the principal railway companies from 1830 until grouping in 1923. Part III (four lectures) is concerned with motive power, including electric and diesel traction, and rolling stock; and Part IV (six lectures) with signalling; railway architecture and civil engineering, contractors, legislation, railway staff matters, historical sources, and other matters. The course will include visits to railway installations, some of which are not normally accessible to the public, and to British Transport Museums. Further details may be obtained from the Head of the Evening Department of Adult Education, Goldsmiths' College, New Cross, London, S.E.14.

Rhodesia Railways Appointments.—In the Official Notices column of last weeks issue reference was made to vacancies on the Rhodesia Railways permanent staff for civil engineers. In the scale of increments for Assistant Engineers it was stated in error that the starting salary was £1,500. This should have read £1,000.

Vickers Research Limited Transfer.—The transfer of Vickers Limited research establishment to Sunninghill, Berkshire, has now been completed. Research at present being conducted on behalf of the Vickers Group includes a variety of projects in the spheres of nuclear, medical, chemical, hydraulic and electrical engineering. The Board of Directors of Vickers Research Limited is now reconstituted as follows: Mr. A. H. Hird, Chairman; Dr. C. F. Bareford, Managing Director; Mr. W. D. Opher; Mr. W. D. Pugh; Mr. L. Redshaw; Mr. S. P. Woodley; Mr. R. P. H. Yapp. The Secretary is Mr. A. D. Read.

Hire of Special Train Equipped with Television.—An 11-coach train accommodating 496 passengers and equipped with television was hired from the London Midland Region, British Railways by two Manchester banking houses for a staff outing from stations in the Manchester area to Morecambe on September 25. It contains a studio for sound and closed-circuit television and a projector for silent and sound films. All coaches are fitted with T.V. sets at both ends so that the screens are visible from any seat. A roving microphone operates from points installed in each coach and a tape recorder provides music. A buffet car was included in the train. The organisers arranged their own television programme, but British Railways provided a



Class "90" diesel-electric locomotive on its trial run, receiving the line clear token at Limuru Station



Left to right: Messrs. Hudson, Marshall, and Mackay speaking to Mr. McCrindle

compère and pianist to fill in any pauses. This was the first occasion on which the train had been used for an excursion from stations in England. Starting from Hazel Grove at 9.50 a.m., it called at Stockport Edgeley, Manchester Oxford Road, Wigan, Preston, and Lancaster.

New Quay and Transit Sheds for Hull Docks.

—British Transport Docks has placed a contract with A. Monk & Co. Ltd., Padgate, Warrington, for the construction of a reinforced concrete piled and decked quay and four steel-frame transit sheds, with extensive rail and road works, on the north side of King George Dock, Hull. The new quay, which will be in continuation of the existing No. 1 Quay, will be 2,430 ft. long, and each of the transit sheds will measure approximately 450 ft. x 150 ft. This contract is part of the £4,750,000 development scheme now in progress at King George Dock. Work is expected to begin shortly and should be completed in about two years.

The British Oxygen Rights Issue of Ordinary Shares.

—The expected capital expenditure of £28 million indicated in the statement of March 4, 1960, by the Chairman of the British Oxygen Co., Mr. J. S. Hutchison, has been increased to about £40 million. The additional expenditure is for production capacity for the supply of industrial gases to the steel industry and other users and for general development of the business. Capital for this purpose is to be obtained by a rights issue of new ordinary shares of 5s. each to ordinary shareholders registered on September 15, 1960, in the proportion of one new share for every five held, at a price of 18s. a share. The new shares will not rank for the final dividend to be declared in respect of the financial year ending September 30, 1960, but will rank in full for all dividends declared thereafter. The estimated trading profit of the group before tax for the year ended September 30, 1960, is £9,400,000, and a final ordinary dividend is expected of 10 per cent less tax (the same as a year ago) making a total for the year of 16 per cent (14 per cent.). The board hopes that it will be possible to maintain this rate of dividend on the ordinary share capital as increased by the present issue.

New Timetable on L.T.E. District Line.—The main changes in the timetable to be introduced on the London Transport Executive District Line on October 10 are increases in the morning service on the Richmond line by one-third and in the trains between Wimbledon and Earls Court in the morning and (by 100 per cent) in the evening; reduction of the through service from the Hounslow line to the City; extension of the present practice, during the evening peak period, of running "non-stop" trains to the morning peak on all branches; and increase in the service on the Upminster line during the non-peak hours. From Richmond there will be a regular service of eight instead of six trains an hr. in the morning peak; they will not stop at Barons Court and West Kensington stations. The evening peak service is already eight trains an hour. On the Wimbledon branch, there will be eight trains an hr. from Wimbledon to the City in both peaks, calling at all stations, including West Brompton; through Edgware Road trains will start from Wimbledon instead of Putney Bridge, not stopping at Wimbledon Park, East Putney, and West Brompton, morning and evening. Southfields and Wimbledon will have a 60 per cent more frequent service to Earls Court, where there is heavy interchange with the Piccadilly Line, in the morning and 100 per cent more frequent in the evening peak, with direct running to Notting Hill Gate and Paddington. The additional non-stopping trains will relieve

pressure on the through City trains. The Ealing Broadway service will not be affected.

Belgian Rolling Stock.—At the end of 1959 the Belgian National Railways (S.N.C.B.) had a stock of 18,937 covered wagons, 40,542 high-sided open wagons and 9,467 flat wagons exclusive of service vehicles. Average loading capacity was 22.6 tonnes. At the same time passenger rolling stock comprised 2,121 steel and light-alloy coaches and 1,643 wooden coaches plus about 200 electric multiple-unit vehicles and 196 diesel railcars. Orders placed during 1959 included 40 second-class couchettes, and 20 twin-car electric multiple-unit sets.

Agreement between Babcock & Wilcox and Vecor.

—A long-term agreement has been made between Babcock & Wilcox Limited and the Vanderbilj Engineering Corporation (Vecor) of Pretoria, with a view to closer co-operation in manufacturing activities in South Africa. The agreement will come into force on December 30 next. The manufacturing facilities of Vecor will be expanded by purchasing works at Vereeniging owned and operated by Babcock & Wilcox of Africa (Pty.), valued at about £1,000,000. Babcock & Wilcox will acquire 400,000 ordinary shares in Vecor in part payment for these assets. Vecor will take a 25 per cent holding in the Babcock & Wilcox African company. The sales, engineering, contracting, erecting and servicing of Babcock & Wilcox products will remain the responsibility of Babcock, whose African company will continue to operate from the present offices at Vereeniging.

Cross-Channel Car Ferry Rates Reduced.

—To encourage winter motoring holidays abroad, the Southern Region, British Railways, the French National Railways, and Belgian Marine, are reducing rates for accompanied motorcars by about 20 per cent by all the car ferry routes operating from Dover. The price cuts also will apply to the Newhaven-Dieppe route when it is running. On all these routes the cheap rates will be offered between October 15 and March 15 of next year to motorists travelling with their cars. The new return rates for the smallest types of car, not more than 11 ft. overall length, will be £5, and £21 for the largest vehicles, over 16 ft. 6 in. long. The railway steamer routes already are much the cheapest way of transporting accompanied motorcars between Britain and France. The object of the new rate reductions is largely to fill, in the winter, the large amount of space for motorcars in the ships provided to cater for summer traffic.

Skefko Ball Bearing Co. Ltd., Subsidiary for Research.—The Skefko Ball Bearing Co. Ltd. is considering formation of a subsidiary company with the main purpose of developing technical and manufacturing research. It is intended to build a factory near Irvine, Ayrshire, for manufacturing production tools, equipment, and some of the specialised machine tools used in the manufacture of ball and roller bearings. The present tool-room activities at Luton are not to be reduced; it is hoped to develop these still further. It is also the intention to house at Irvine certain auxiliary departments concerned with manufacturing operations which can be separated conveniently from the main production of bearings at Luton and Sundon. This development in Scotland will result in some contribution to the Government's policy to provide employment in that area. It is expected to result in reduced importation of certain equipment and thus make the company more self-supporting in this respect. It will probably also provide the possibility of increasing exports to associated

companies abroad. The Skefko Ball Bearing Co. Ltd. will continue to regard Luton as its main centre of operations, and large additions to the Sundon plant and equipment are already on order.

Driverless Platform Trucks for Goods Depot.

—The daily average discharge rate of packages at Herbert Street depot, Wolverhampton, British Railways, Western Region, is 167 tons, not 16 tons as stated in error on page 363 of last week's issue.

Crossley Bros. Ltd. Decreased Dividend.

—Crossley Bros. Ltd., manufacturers of diesel and gas engines, is paying a dividend of 5 per cent for the year ended April 30, 1960, compared with a total of 12 per cent for 1958-59. Group trading profit fell sharply from £344,306 to £177,639, and the net profit is down from £94,615 to £14,811, after allowing for depreciation of £107,704 (£113,690) and tax of £1,230 (£71,507).

Vickers Limited Interim Dividend.

—Vickers Limited is to pay an interim dividend of 2½ per cent, less tax, on October 21. The group profit for the six months to June 30, 1960, are estimated at £2,490,000, against £1,780,000 for the first half of the previous year. For the whole year 1959 they amounted to £4,930,000. As regards the second half of the current year, business is reported to be active, and profits are believed to be running at about the same level as in the first six months of the year.

Sligo Leitrim & Northern Counties Railway Co. Ltd., Liquidation.

—The Northern Ireland High Court has made an order allowing for distribution of £45,000 to 80 holders of "A" debenture stock of the Sligo Leitrim & Northern Counties Railway Co. Ltd., which is in liquidation. This sum represents 50 per cent of the total claim of the "A" debenture holders. The case was before the Court by way of a summons brought by the joint

French Railways Publicity



One of two new French National Railways posters depicting the St. Gervais-Chamonix Vallorcine narrow-gauge electrified line

official liquidators to determine between the various classes of debenture holders "A" "B," "C" and "D." The Judge ruled that the "A" stock had priority. All the assets of the company are stated to have been sold except for some level-crossing gate-houses. The railway was closed on October 1, 1957.

Forthcoming Meetings

- October 1 (Sat.).—Electric Railway Society, at the Fred Tallant Hall, 153, Drummond Street, London, N.W.1, at 7.15 p.m. Paper entitled "A European Survey," by Mr. G. W. Morant.
- October 1 (Sat.).—Railway & Canal Historical Society, at the eastern section of Booking Hall, Victoria Station, London, at 2.15 p.m. Centenary of the opening of Victoria Station, conducted tour.
- October 1 (Sat.).—Railway Correspondence & Travel Society. "Northern Heights" tour. Departure from Fenchurch Street, Station at 1.55 p.m.
- October 2 (Sun.).—Railway Correspondence & Travel Society, North Eastern Branch, rail tour.
- October 3 (Mon.).—The Society of Engineers, at Burlington House, (entrance at east end), London, W., at 5 p.m. Paper by Mr. W. A. Crago on "Some notes on Hovercraft," illustrated by a film.
- October 3 (Mon.).—Institute of Traffic Administration, Manchester Branch, at the Engineers' Club, Manchester, at 7 p.m. Film show.
- October 4 (Tue.).—Railway Correspondence & Travel Society, Sheffield Branch, at Livesey-Clegg House, Sheffield, at 7.30 p.m. "Russian Railways"—a talk by Mr. J. H. Price.
- October 4 (Tue.).—Goldsmiths' College, New Cross, London, S.E.14, at 7 p.m. The first of 26 lecture-discussions on "Railways in Britain, 1802-1960." Tutor: Mr. R. H. G. Thomas.
- October 5 (Wed.).—Railway Travel & Correspondence Society, Lincs & N. W. Branch, at B.R. Staff Asscn., Carnforth, at 7 p.m. Paper on "British Railways Marine Services," by Mr. A. E. Willmott.
- October 5 (Wed.).—The Newcomen Society, Annual General Meeting, at the Science Museum, South Kensington, London, S.W.7, at 5.30 p.m. Presidential Address by Mr. C. E. Lee.
- October 5 (Wed.).—British Railways (Southern Region) Lecture & Debating Society, at the Chapter House, St. Thomas' Street, London, S.E.1. Address by Brigadier Langley on "The History & Work of the Railway Inspectorate, Ministry of Transport."
- October 5 (Wed.).—Electric Railway Society, at the Fred Tallant Hall, Drummond Street, London, N.W.1, at 7.15 p.m. "Southern Region (Eastern Section) Electrification, Past and Present," a talk by Mr. R. C. Riley.
- October 6 (Thu.).—British Railways (Western Region) London Lecture & Debating Society, Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, at 5.45 p.m. Paper on "A Day in Parliament" by Mr. P. Morris.
- October 6 (Thu.).—Railway Correspondence & Travel Society, Bristol Branch, at the Grosvenor Hotel, Bristol, at 7.15 p.m. Illustrated talk by the Rev. C. A. Selman.
- October 7 (Fri.).—Railway Correspondence & Travel Society, West Midlands Branch, at Exchange & Engineering Centre, Birmingham, at 7.15 p.m. Paper on

"Minor Railway History—Investigation Methods," by Mr. E. S. Tonks.

October 8 (Sat.).—Permanent Way Institution, London Section. Visit to Jodrell Bank Radio Telescope, and Electrification Works between Crewe and Manchester Oxford Road.

October 8 (Sat.).—Railway & Canal Historical Society, North Western Section, at The Oddfellows Institute, Chester-gate, Stockport, at 6.30 p.m. Open meeting; address by the President, Mr. C. R. Clinker.

Railway Stock Market

Uncertainties as to the outcome of the United Nations meeting have dominated stock market sentiment, and values generally were lower again, though most declines were small. It is now generally realised that the credit squeeze will not be lifted until there is real improvement in export trade, and that may be dependent on the trend of business conditions in the U.S.A.

Among foreign rails, Costa Rica ordinary stock remained steady at 40 with the first debentures 94½ and the second debentures again 112. Chilean Northern 5 per cent first debentures have changed hands around 55½.

Brazil Rail bonds again had a quotation of 5½, Guayaquil & Quito assented bonds were 69½ and Paraguay Central prior debentures kept at 15. United of Havana consolidated stock was quoted at 1 with the second income stock at 6.

In other directions San Paulo Railway 3s. units were 1s. 1½d. and Mexican Central "A" bearer debentures gained a point at 58½.

International of Central America shares held their recent improvement to \$25, but the preferred came back from \$105½ to \$103½.

Antofagasta ordinary stock at 12½ and the preference at 31 have been well maintained, while the 4 per cent perpetual debentures were 45½.

Canadian Pacifics, although again inclined to move lower with Wall Street, at \$40½ were virtually the same as a week ago. The 4 per cent preference stock, however, reacted from 62 to 61½, and the 4 per cent debentures eased from 64½ to 64. White Pass shares were again \$11½.

Elsewhere, among French railway sterling bonds, Midi 4 per cents were quoted at 86.

Nyasaland Railways shares remained at 9s., and the 3½ per cent debentures at 45½. Midland of Western Australia second income stock changed hands and was again quoted at 27½. West of India Portuguese was at 111½xd. with Barsi ordinary stock 17½.

There were small irregular movements among shares of locomotive building, engineering and kindred companies. G. D. Peters have been easier at 13s. 9d., while Beyer Peacock 5s. shares came back further from 7s. 9d. to 7s. 3d.

Still under the influence of the directors' statement about the group's hire purchase subsidiary, Charles Roberts 5s. shares have reacted further from 9s. 3d. a week ago to 8s. 9d.

Elsewhere, Gloucester Wagon 10s. shares again reflected the lower dividend, having receded afresh from 12s. to 11s. 6d. Wagon Repairs 5s. shares, however, were a good feature with a fresh rise from 18s. 3d. to 19s.

Elsewhere, Westinghouse Brake, reflecting the reactionary trend in stock markets, have declined on balance from 49s. to 47s. 3d. North British Locomotive improved on balance from 9s. 3d. to 9s. 9d. and Birmingham Wagon were firm at 35s.

OFFICIAL NOTICES

BRITISH RAILWAYS
(Scottish Region)

SENIOR WORK STUDY ASSISTANT
(OPERATIONAL RESEARCH)

BRITISH RAILWAYS require for their Headquarters Organisation at Glasgow, a Senior Work Study Assistant experienced in the use of scientific methods to Management problems including the use of Operational Research techniques and with Mathematical qualification. Applicants should be work study trained or be willing to undergo training. The duties will involve being away from home as required.

Salary £1,260 per annum rising to £1,490 per annum subject to review. Travel facilities. Contributory Superannuation Scheme. Applicants will be in competition with candidates from within the Commission's service.

Applications, stating age, education, experience and qualifications, should be addressed to the General Manager, British Railways, 302 Buchanan Street, Glasgow, C.2.

TWO Ruston & Hornsby 44/48 H.P. Diesel Shunting Locomotives fitted with three speed forward and reverse gearboxes, suitable for 4 ft. 8½ in. standard gauge tracks. Purchased new 1944/46. Both in good working condition, fully maintained. Complete with full range of spares. Appointments to view, Write Box 52. The Railway Gazette, 33 Tothill Street, S.W.1.

Foreign Employment
ROADMASTER

ENGINEERING GRADUATE preferred; minimum of two years engineering training essential.

Require two years varied railroad engineering service, or five years in direct charge of track crews. Will supervise 135 men maintaining 45 mile railroad, assign work, order materials, be responsible for safety, make regular detailed inspections of roadbed and all track on main line, sidings and yards, bridges, tunnels, etc. Will make engineering calculations relating to maintenance and use of structure and equipment. Must speak Spanish. Married or single candidates acceptable.

Excellent opportunity large copper company, Chile, South America. Two year contract with transportation both ways for you and family. Basic salary \$525.00 to \$650.00 per month depending upon age and experience of applicant.

Box 6, The Railway Gazette, 33 Tothill Street, S.W.1.

East African Railways and Harbours Administration
Assistant Mechanical Engineer

PENSIONABLE appointment. Salary £1,170-£1,755. (at present under revision). Free passages. Free furnished quarters for first tour; thereafter furniture rental is payable.

Candidates preferably 25-45 years must have passed or be exempt from Parts I and II of the examination of the Institution of Mechanical Engineers and have served an apprenticeship with a British railway or a firm of locomotive or diesel engine builders, followed by at least four years practical experience in the Mechanical Department of such an undertaking.

Candidates may also be considered for contract appointment on special terms with gratuity. Write Director of Recruitment, Colonial Office, London, S.W.1, giving full names, age, qualifications and experience, quoting BCD 173/06/D15.

REQUIRED for the Southern Railway of Peru. Junior Assistant Engineer with experience of railway maintenance and capable of taking charge of drawing office. Age between 24 and 30, preferably single, knowledge of Spanish an advantage. Salary offered £1,250/£1,350, according to experience. Apply in writing to the Peruvian Transport Purchasing Company Limited, Suffolk House, 5, Laurence Pountney Hill, Cannon Street, London, E.C.4.

ADMINISTRATIVE OFFICER

REQUIRED by the GOVERNMENT of NORTH BORNEO Railways Department on contract for one tour of 2-3 years in first instance. Salary scale (including Inducement Pay) equivalent to £1,218 rising to £2,268 a year. Child Allowance £75/£140 a year. Gratuity at rate of 15% of final basic salary for each completed month of service. Outfit allowance £200. Education Allowance. Free passages. Liberal leave on full salary. Candidates, preferably 40-45 years of age, must be fully experienced in Railway operating and Commercial methods and practice, part of which should have been gained with an overseas railway. They must also be Corporate Members of the Institute of Transport. Experience as a Railway Traffic Training Officer would be an advantage. Write to the CROWN AGENTS, 4, Millbank, London, S.W.1. State age, name in block letters, qualifications and experience and quote M3C/53042/RA.

